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AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. I SEPTEMBER, 1918 No. 9

THE TREATMENT OF BLOOD CYSTS OF THE ORBIT.

HAROLD GIFFORD, M. D., F. A. C. S.

OMAHA, NEB.

A report of three cases of this condition, with discussion of its pathology and treatment. This is a paper presented to the Section on Ophthalmology of the American Medical Association, June 14th, 1918, and published here through the courtesy of the Journal of the American Medical Association.

The subject of blood cysts of the orbit is treated, if at all, in a very stepmotherly way in all the classical works that I have consulted. Aside from the standard types of cyst, namely, dermoid, mucocele, cephalocele, and meningocele, other cysts of the orbit are either not mentioned at all, or in such a perfunctory way that the impression given is that the author has never seen anything of the kind. The treatment described is also either of the absent variety, or is so sketchy as to convey no impression of personal experience or conviction. On the other hand, I have seen three cases which indicate the importance of keeping such cysts within our purview, and of having some definite ideas as to the best method of treatment.

REPORT OF CASES.

Case 1.—A boy aged 8 years, was brought to me in June, 1905. There was a history of his having fallen and struck the left eyebrow when two years old. The father thought that the left eye was a little larger than the right, but it gave the child no trouble until two days before he came to me, when it began to pain him and to protrude.

The right eye was found to be normal, and the left eye was pushed far forward and downward, the cornea being about 5 mm. farther forward than that of the right eye. The ophthalmoscope showed somewhat enlarged veins, but no other abnormality. The vision was 20/20—. The boy felt sick and had considerable pain at times. He was put to bed and given full doses of potassium iodid with some apparent improvement. But after three weeks, as the exophthalmos was evidently increasing, the contents of the orbit were exposed by the Krönlein method, and a dark-colored tumor within the muscle funnel could be seen extending back toward the apex of the orbit. The tumor was nearly three-fourths of an inch in diameter and felt quite firm. But on my attempting to outline it with the finger, it suddenly collapsed and a large quantity of dark brownish fluid poured out of the wound. On cleaning this away, I could neither see nor feel the tumor. So I replaced the outer wall of the orbit and the wound healed without any reaction

The pain ceased at once and the eyeball returned to a nearly normal position. Three months later the boy was brought back with the eyeball bulging nearly as badly as ever and the sight of the left side reduced to about 20/100. The outer wall of the orbit was again turned back, and when I opened the periosteum the tumor was plainly visible. This time before palpating it, I secured the tumor by passing a suture through its wall. It was again opened and a brownish fluid similar to that

seen at the previous operation was evacuated.

The cyst was multilocular, since, on my introducing my finger into the first cavity, one or two other cavities were broken into and evacuated. The cavity led along the optic nerve to the apex of the orbit. It was swabbed out, first with dry swabs, then with swabs dipped in 95 per cent phenol (carbolic acid), the latter being passed firmly down to the end of the cavity, and finally with swabs dipped in alcohol. The bone was then replaced, and although the patient had a temperature of 102 F. at the end of twenty-four hours, on the succeeding day the temperature became normal, and there was no further reaction.

The eyeball receded so as to be very little, if at all, more prominent than the right eyeball. There was a slight convergent strabismus, and the vision at the end of two weeks without the correction was 20/30—. When the patient was last heard from, about two years later, the condition was satisfactory.

Case 2.—R. G., a strong, healthy boy, aged 15, was brought to me April 3, 1917. There was no history of any injury. In January, 1916, the mother noticed that the left eye seemed a little larger than the right. This difference slowly but steadily increased; until, at the time of my first examination, the left eye was pushed forward about one-half inch farther than the right eye, with a somewhat limited motion inward.

The vision was 18/20+, and the fundus normal. There was no diplopia and no pain. The right eye was normal, the vision being 18/15. As an examination of the nose and a roentgenogram gave no clue to the cause of the exophthalmos, an exploratory incision through the outer half of the eyebrow was made and a firm but somewhat elastic tumor could be felt filling up the outer half of the orbit, extending to an undefined extent backward and inward.

I am bound to confess that in spite of my experience in the preceding case, the idea of the tumor being a blood cyst did not occur to me and I gave a very guarded prognosis as to the possibility of my being able to remove the tumor without spoiling the eye. One week later I cut away enough of the outer wall of the orbit to expose the tumor plainly, and while I was passing a suture through the tumor to aid in removing it, a little dark brown fluid escaped, which led me to incise the tumor freely. It turned out to be a large cyst, made up of several pockets more or less completely separated and filled with a brownish fluid. These were broken up with the finger, and after firmly packing the cavity, which extended back to the apex of the orbit, I used phenol freely as in the preceding case, and finished by swabbing with alcohol.

A small drainage tube was left in the external wound for two or three days, but there was no reaction nor discharge. When the boy went home several weeks later, the vision was normal in each eye. The left eyeball was very slightly more prominent than the right, with movement inward and outward slightly restricted. There was a slight ptosis and diplopia on the patient's looking to the left. Three months later, the mother reported that the eye seemed to be getting a little large; Sept. 10, 1917, however, his home oculist, Dr. Vercoe of Lead, S. D., wrote me that the eye had receded to its normal position.

Case 3.—Mrs. W. P., aged 40, came to me, Oct., 1909, complaining that for three years she had been having pain in the right eyeball, which had been gradually getting larger than the left. The right eye was protruded at least a half inch farther forward than the left, and there was moderate restriction of the motility in all directions, especially to the right. The fundus was normal and the vision 20/20—, with correction. The left eye was normal and the vision with correction was 20/20+. As no operation was desired, the patient was not seen again for five months, when she returned with the exophthalmos and restriction of the motility in the right eye more pro-

nounced. The vision and fundus were unchanged.

The outer border of the orbit was then removed and a somewhat pyramidal tumor 1¼ inches broad at the base and 1½ inches long was removed from behind the globe by a blunt dissection, except at the last stage, when a rather firm band had to be cut with the scissors. The exterior of the tumor was very irregular, showing a number of dark nodules, and being cut open before hardening, it proved to consist of a mass of connective tissue filled with spherical pockets from one-eighth to three-sixteenths inch in diameter, each pocket being filled with a mass of coagulated blood. These masses shelled out of the pockets like peas. Toward the center of the tumor the blood clots seemed fresher than toward the periphery.

The operation was followed by no reaction, and the patient went home in two weeks with the vision in the two eyes the same as before the onset of the trouble. The exophthalmos had disappeared, but the motion was still somewhat restricted in all directions. The lower half of the pupil showed a moderate dilatation and did not respond to light or convergence. The fundus was unchanged. I have heard from her from time to time since then, and there has been no sign of a return.

COMMENT.

The interest of the last case centers in the unusual nature of the tumor. Without pretending to say that others of the same nature have not been reported, I have not been able to find any. Apparently the tumor was the result of an intermittent leak in some small vessel, the hemorrhages occurring from time to time and becoming encapsulated so that they were separated by well defined walls.

The contents of the cysts in cases 1 and 2 were not examined microscopically nor chemically, but as they presented the characteristic appearance of disorganized blood, they probably resulted from defective blood vessels which leaked more continuously than in Case 3.

Although the feeling and the history of the tumor in Case 3 naturally suggested a much too serious prognosis, it would have made no difference in the treatment, even if the nature of the tumor had been known. In Cases 1 and 2, on the contrary, not only was the prognosis faulty, but if the capsules of these cysts had been a little thicker, I should undoubtedly have persisted in my attempt to enucleate them intact and might have done so at the risk of causing the loss of the eyesight or of the eye in either case.

As to the proper treatment of these and other deep seated orbital cysts, except rare forms like that in Case 3, if such results as were produced in my first two cases can be generally obtained, it is evident that it would be a mistake to attempt to enucleate them; or to cure them by curetting, until the simpler treatment with phenol or something similar has been tried. Whether the injection of tincture of iodin, which some authors suggest (apparently without having tried it themselves), would be as effective and safe may well be doubted. If I were to have a recurrence after using phenol, I should try trichloracetic acid. It occurs to me that if in the future I should encounter a dermoid having the long, sinus-like extension, which I have occasionally seen in the past, I should destroy the skin lining it with trichloracetic acid rather than try to excise it or to destroy it with silver nitrate or iodin, as recommended by Buller, according to de Schweinitz.

CONCLUSION.

In every case of deep-seated orbital tumor of uncertain nature, the possibility of its being a blood cyst or some other benign cyst should be considered. If an operation is done, the tumor, on being exposed, should be secured by passing a thread through it and its nature should be tested by a puncture. If it proves to be a cyst, thoro cauterization with phenol or something similar in effect should be tried before an attempt is made to extirpate it.

THE MANAGEMENT OF CASES OF NON-INFLAMMATORY GLAUCOMA, CLASSIFIED AS SIMPLE ANTERIOR OR SIMPLE POSTERIOR GLAUCOMA.

COL. WALTER R. PARKER, MEDICAL CORPS, N. A.

DETROIT, MICHIGAN.

This paper based on recognition of two classes of glaucoma suggests the operative treatment appropriate to each, and reports the results attained by such treatment in sixty cases. Read before the Canadian Medical Association at Hamilton, May 30th, 1918. Publication approved by Board of Publication, office of the Surgeon-General.

I shall not attempt to discuss the various types of glaucoma, nor to present the characteristics of the different forms of disease, but I shall briefly consider some of the clinical manifestations of the simple non-inflammatory type and suggest a possible classification which may be of assistance in determining the best mode of treatment in the individual case. Usually the type of glaucoma has been the main factor in determining the operation to be performed in a particular case. A study of a limited number of cases of simple glaucoma has suggested the possibility of dividing them into anterior glaucoma and posterior glaucoma, and of considering each division independently from an operative standpoint.

There are many things we do not know about glaucoma, but a few clinical facts stand out clearly in the experience of every one who has studied carefully any considerable number of cases. For instance, it can be stated that there is no direct relation between the tension of the eyeball and the depth of the anterior chamber. While the chamber is shallow in the majority of cases, it not infrequently happens that, although the tension is high a moderately deep chamber will persist. Again, it cannot be definitely stated what degree of tension of the eyeball is pathologic for all cases. That is, the upper limit of the normal tension is not the same for all individuals. Further, there is no definite relation between the tension of the globe as determined by the tonometer, and the contraction of the visual fields. One case with a slight rise of tension will show deep cupping of the nerve head and serious loss of visual acuity, while another with higher tension over a long period of time, will still retain a surprising amount of vision and fairly full fields. I have no definite knowledge of the relation of the fields to the duration of differing degrees of increased tension. The resisting quality of the tissues involved will always offer an indeterminate quantity and keep the problem most complicated.

Another conspicuous fact is that while many cases of simple glaucoma are relieved after an iridectomy has been performed, others, with an equally perfect operation, are not improved, and a few are made worse.

In the determination of whether or not a case is doing well the field of vision for colors, and especially for form, offers our best guide. The tension, however, as determined by the tonometer, should be taken at frequent intervals and is an indication as to whether or not we may expect an improvement in the field of vision from the treatment. It is dangerous to rely on the diminished tension alone, as it is impossible to know the maximum tension that may be pathologic for the particular case. Diminished tension must be accompanied by visual fields that show improvement, or at least are not deteriorating, before it can be determined that the process is not progressing. The visual acuity may offer some guidance as to the progress of the disease in late cases, but the vision may remain quite normal until the case is far advanced.

Every case of simple glaucoma that has not been given medical treatment

should be given a thorough course for the betterment of the general condition, together with the local use of eserin or pilocarpin before being subjected to any operative procedure.

The fact that an iridectomy at times gives a result that is perfect surgically, and leads to the complete relief of the increased tension, while at other times an operation equally well performed will be unsuccessful, leads to the natural conclusion that if the cases could be properly selected, the iridectomy would be successful in a much larger number. On the other hand, the trephine operation, as developed by Colonel Elliot, of London, England, frequently succeeds in a group of cases which heretofore has been unsuccessfully treated by other methods of procedure. If, then, we can so classify our cases clinically as to enable us to select the group which is relieved by iridectomy or other operation based on freeing the anterior lymph system, and the group best suited for trephine operation, it would offer a definite mode of procedure and possibly lead to the best average results.

For the past four or five years I have attempted to divide clinically all cases of chronic non-inflammatory glaucoma into two groups, (1) simple anterior glaucoma, (2) simple posterior glaucoma. The classification is based upon the assumption that either the anterior or posterior lymph system is more seriously involved, and that the increase of tension of the eyeball is due to the retention of fluids that normally have two sources of outlet, one through the anterior lymph system through the spaces of Fontana, and the other through the posterior lymph system, the perichoroidal space, around the venae vorticosae into Tenon's space, and around the optic nerve.

If the anterior lymph spaces are blocked, there will be a tendency for the excessive fluids to flow toward the posterior outlet, thus tending to hold the lens and iris in its normal position, or at least preventing an entire obliteration of the anterior chamber. If the posterior lymph system is involved and the normal outflow maintained through the anterior lymph channels, there will be a tendency for the lens and iris to follow the current and gradually to be pushed forward, leading to a shallowing or obliteration of the anterior chamber. There is, then, in the depth of the anterior chamber an indication as to whether the case falls in the anterior or posterior group. In the late stages of all cases the iris base undoubtedly becomes adherent, but this condition should appear earlier and be more marked in the cases classed as posterior glaucoma.

If the anterior spaces are obstructed they may be relieved in part by a broad deep iridectomy. On the other hand, if the anterior spaces are normal and the obstruction is excessive in the posterior lymph channels, an iridectomy will be of no avail.

The means by which a trephine operation relieves the tension has nothing to do with the condition of the lymph channels. It is based almost entirely upon the establishment of a permanent filtrating cicatrix which permits excessive fluids in the globe to pass out into a subconjunctival space and there become absorbed.

If, therefore, we have an anterior glaucoma the choice of operation would be an iridectomy. On the other hand, if the posterior system is involved, or both the anterior and posterior are involved the trephine operation will be one of choice. There is one exception to be made. We all know only too well that cases of simple non-inflammatory glaucoma which have so far advanced that the visual fields are contracted to twenty or thirty degrees, do not do well after an iridectomy has been performed. I would therefore make an exception of this group, whether classified as anterior or posterior glaucoma.

In this connection I shall repeat a portion of the results obtained in a series of cases reported before the Clinical Surgical Congress at its meeting held in Philadelphia, 1916, and published in the Archives of Ophthalmology for 1917.

In nineteen selected cases of simple anterior glaucoma in which an iridec-

tomy was performed, a good result was obtained in thirteen cases, or in 72.2%.

In 41 cases of simple posterior glaucoma, or those not suited for iridectomy, which were subjected to the Elliot operation, a good result was obtained in 31 cases, or 75.5%.

The nineteen cases selected for an iridectomy offered a more favorable group for any operative procedure than did those selected for the trephine operation. The results were about the same in each instance.

These cases all occurred in the Ophthalmic Service in the University of Michigan.

To summarize:

1. All cases of simple glaucoma should be given a thoro course of general and local treatment (including careful refraction), before being subjected to any operative procedure. The general treatment is directed toward improving the patient's condition. The local medical treatment is limited to the use of eserin or pilocarpin.

2. The depth of the anterior chamber offers a basis of classification of all cases of chronic non-inflammatory glaucoma into simple anterior and simple posterior glaucoma.

3. All cases of simple glaucoma which can be classified as anterior, with the exception of those in which the visual field is markedly contracted, should be subjected to an iridectomy, while all cases of simple posterior glaucoma and all cases with markedly contracted field of vision should be subjected to a trephine operation.

I wish to emphasize the fact that these suggestions are all based on clinical observations and have not been verified by the examination of pathologic specimens.

REFRACTIVE DIFFERENCES IN FOVEAL AND PARAFOVEAL VISION.

DAIZO OGATA AND FRANK W. WEYMOUTH.

STANFORD UNIVERSITY, CALIFORNIA.

A report of experimental studies made in the Laboratory of Physiology, Leland Stanford University, comparing foveal and parafoveal vision by strong or feeble light, with a discussion of the causes of the phenomena observed, including nine tables, with bibliography.

The suggestion for the present work came from an observation of one of the authors (W.) that glasses which satisfactorily corrected his hyperopia in the daylight proved too strong, that is, "overcorrected," in the evening when out of doors, often to such an extent that they were discarded. This has since been confirmed in several other hyperopes.

An attempt was therefore made to determine the nature and extent of this difference under experimental conditions admitting of satisfactory control, and should such a difference be clearly proven, to explain it on the basis of the known structure of the eye or of changes hitherto assumed to take place in it.

The first experiments were concerned with a comparison of the refraction in foveal vision in the light and in the dark-adapted eye. Since it was soon apparent that these showed no striking differences the work was extended to a comparison of the refraction in the regions near the fovea (parafoveal vision) since it was known that these are used in twilight vision. The data thus obtained permitted the comparison between foveal and parafoveal vision both light and dark-adapted.

The problem of the adaptation of the eye to light and dark has been studied carefully and discussed repeatedly by numerous physiologists and ophthalmologists both from the view point of anatomy and of physiology. Among

these we may count Engelmann ('85), Hering ('95), Fick ('98), Broca ('00), Kries ('01), Piper ('03), Nagel and Schaefer ('04), Garten ('06), ('07), Hess ('07), and Woelfflin ('10). Notwithstanding the considerable amount of investigation in this field, as far as we could discover no one has studied this problem from the standpoint of refraction, and in fact the methods usually employed would preclude this, as the test objects used were placed on the arm of a perimeter or otherwise so near that accommodation was not avoided.*

The experiments were carried out in the Laboratory of Physiology of the Leland Stanford Junior University, at the suggestion and under the direction of the senior author (W.). The experimental procedure and the statistical handling of the data obtained are almost wholly the work of the junior author (O.); for the discussion and theoretic consideration the authors are jointly responsible. We wish to express our indebtedness to Professor E. G. Martin and other members of the department for suggestions and helpful criticism, to Professor J. E. Coover for his aid in certain statistical questions encountered and finally to those who willingly consented to be the reagents for these experiments.

APPARATUS AND METHODS.

All experiments, except a short series with the punctumeter, were made in the dark room. For light adaptation, observations were carried on with three 60 watt lamps placed less than a meter from the reagent, but screened to prevent direct illumination of the eye or test object. For adaptation to dark the uniform procedure was adopted of spending 5 minutes in complete darkness before beginning an experiment. The minimum time for a set of observations was 20 minutes, so that the experiments were carried on under adequate tho not extreme adaptation.

Observations were uniformly carried on with the test object at 5 meters. The form of the test object proved to be a matter of some difficulty. The parafoveal region used in most experiments lay 5° from the fovea and therefore had, according to the work of H Dor ('73) a form sensitivity one-fourth that of the fovea itself. For this reason the test object first tried, consisting of parallel wires similar to that mentioned by Landolt ('04), while suitable for the determination of the refraction in the fovea could not be used for the parafoveal regions, and the same was true of test type of any given size.

Since it was desirable to use the same test object for both regions in order to have as few variable factors as possible, a slender illuminated triangle, suggested by the observation of an arch (see Table 7), was finally adopted. An isosceles triangle 15 cm. high and 4 cm. broad at the base was cut from a black screen placed before a ground glass. A uniform illumination of this was obtained from a second ground glass about 60 cm. distant which formed one end of a light-tight box at the opposite end of which and about 60 cm. distant were two 60 watt lamps. The apex of the triangle was sharp enough for a test of foveal vision and its tapering shape was found at the same time to be very well fitted for that of parafoveal vision, tho the apex was, of course, not quite so distinctly seen.

As a fixation point in the case of parafoveal vision use was made of a very small bright spot formed by the light coming thru a small hole (about 0.3 mm. in diameter) in an otherwise light-tight metal case. By appropriate placing of this fixation point the light from the test object could be made to fall on any desired part of the retina outside the fovea centralis.

* Since writing the above, Dr. Edward Jackson has been kind enough to point out two previous references to this phenomenon. In 1888 (Jackson, '88) he recorded a difference of refraction in the light and in the dark in his own and other cases and gave an explanation which will be considered in another place in this paper. He also noted that Lord Rayleigh (Encyclopedia Brittanica, 9th ed., Optics) had previously recorded the fact that he was distinctly myopic in a dark room, tho not in the light.

The refraction was determined by a De Zeng phoro-optometer carrying a battery of lenses in quarter diopters with supplementary lenses giving eighth diopters. These latter were not much used, as it was found that the quarter diopters were as small as could conveniently be employed. The usual procedure was to make 40 observations at a sitting as follows: 10 each of foveal and of parafoveal refraction alternately in the light, then 10 each alternately when the eye had become dark adapted. The observer did not, in the majority of tests, know the strength of the lens selected; a too strong convex, or too weak concave lens was placed before his eye by the experimenter at the beginning of the reading, the disc carrying the lenses was turned by the observer until he felt satisfied that the clearest vision was attained, and the lens selected was observed and recorded by the experimenter. Since the chief difference found was between foveal and parafoveal vision and these determinations were made in alternate observations it seems improbable that any factors influencing accommodation should differ and this belief seems justified by the results obtained when homatropin was used (see table 6).

In some tests artificial pupils of different sizes (2, 3, and 4 mm. in diameter) were used, placed close to the observer's cornea. As a check on the accuracy of observation of the test object a series of determinations were made with a shaking slit; a piece of apparatus employing the principle of Scheiner's experiment, which will be more fully described in a forthcoming paper.

Observations were made upon ten people who are designated in the table by Roman numerals. No. I was F. W. Weymouth, No. II Mr. W. H. R., an instructor in another department who had had considerable experience in observation, No. III Miss L. W., an assistant in the Physiology Department, No. IV Mr. J. K. L., No. VIII Mr. T. F., No. X Mr. M. T., students of the university, No. V Mr. K. N., No. VII Mr. T. A., No. IX Mr. O. M., the latter two university professors, and No. VI was D. Ogata.

In all cases the right eye was used and tho hyperopes and myopes were not excluded astigmatism was carefully tested for and excluded or corrected.

When a punctumeter was made use of, a card with two tiny holes of different sizes, one for foveal and the other for parafoveal vision was employed, instead of the ordinary test card attached to this instrument. The distance of these two holes must be calculated for each ametropic eye.

In addition to the difficulty of the accurate calculation of this distance, the change of the position of the test object, which naturally must take place in the use of this instrument, makes the results even more inaccurate.

Because of the difficulties in the use of the punctumeter, and the defects in the method first tried of using separate test objects for foveal and parafoveal vision, it seems to us that the observations made with the same test object (triangle), approaching as it does, more closely to the conditions met with in the ordinary use of the eyes, was by far the most satisfactory and we will confine ourselves chiefly to a consideration of the results obtained in this way.

RESULTS OF EXPERIMENTS.

It was originally the intention to present the results of the experiments in tabular form as this is the only way in which the original data can be adequately recorded. These tables have, however, proved too bulky for the present publication and the numerical results will be given partly as much abridged tables and partly as summaries. In considering these it must be borne in mind that the differences are usually small; and that only by the treatment of large numbers of observations according to modern statistical methods can their significance be shown. As presented the actual values of the lenses used. and the values of the standard deviation or other measure of the variability, have had to be omitted. Only differences, with the

value of their probability of significance have been given in most cases.

The determination as indicated above of refraction in the light and in the dark, both in foveal and parafoveal vision, made possible six comparisons as follows:

1. Foveal light with foveal dark;
2. Parafoveal light with parafoveal dark;
3. Foveal light with parafoveal light;
4. Foveal dark with parafoveal dark;
5. Foveal light with parafoveal dark;
6. Foveal dark with parafoveal light.

It is plain that the first and second combinations differ only in the condition of illumination and that the third and fourth differ only in the region of the retina considered.

These six comparisons were carefully made for each of the ten reagents, there usually being available 20 observations evenly divided between the two contrasted conditions, tho in some cases 40 to 80 observations could be compared.

1. *Differences in refraction between vision in light and vision in dark.*

The first two comparisons are given in Table 1.

that was clearly above the range of experimental error while a second approached this. In these the difference was about a quarter of a diopter. The other reagents are equally divided between opposing results too small or too variable to be significant and may therefore be considered the same in the light as in the dark.

In parafoveal vision here and elsewhere unless the contrary is stated the fixation point was placed on the right side of the test object and at such a distance that the image of the latter would fall about 1.378 mm. temporally from the fovea centralis. The line connecting this point with the nodal point would thus make an angle of about 5° with the visual line. In parafoveal vision the results are essentially the same as in foveal vision, tho it may be noted that the significant differences are shown by different reagents than in the first case.

The small number of reagents showing significant differences, the fact that these are not the same in foveal and in parafoveal vision, and the small amount of the differences, combine to indicate that this type of difference is neither very common nor very important, tho its pres-

TABLE 1

A Comparison of Foveal Refraction in the Light and in the Dark, and of Parafoveal Refraction in the Light and in the Dark.

	More Myopic or Less Hyperopic in Dark			Less Myopic or More Hyperopic in Dark			Equal
Value of x/σ	4 or More	3 to 4	Less Than 3	4 or More	3 to 4	Less Than 3	
Foveal vision—							
Reagent	V	IV	I, II, III, IX			VI, VII, VIII, X	
No. observations	20	20					
Difference in D.	.28	.23					
Parafoveal vision—							
Reagent	I	II, III	V, VII, IX			IV, VI, VIII, X	
No. observations	40	20, 40					
Difference in D.	.35	.12, .20					

The reliability is indicated by the values of x/σ which represent the probability of significance of the differences of the means. Where this value is 3 there are 135 chances in 50,000 that the difference is accidental; when 4, 3 chances in 50,000 (Davenport, '14). We have uniformly considered those differences where x/σ equals 4 or more as significant. The ten reagents are represented by the Roman numerals as before stated. The number of observations and the amount of the differences have not been recorded in those cases where differences were so small as not to be significant. These explanations apply to most of the following tables.

It will be seen that of the ten reagents only one showed a difference between foveal vision in the light and in the dark

ence in 10 to 20 per cent of the people examined can hardly be doubted and in all these cases it was in the same direc-

tion. It is possible that these differences would be greater with more extreme conditions of illumination than those here used.

2. *Differences in refraction between foveal and parafoveal vision.*

The remaining four of the six possible comparisons outlined above, in which different parts of the retina, or in addition to this different illuminations are contrasted, remain to be presented and are given in Table 2.

mutually cancelling. The differences are thus plainly greater than those shown in Table 1 and exhibited by more of the reagents. This conclusion is strengthened by the fact that the four reagents which gave significant differences in all the comparisons are those who were experimented upon more than the regulation 20 times, or were more experienced in observation, or both.

Let us examine the data more in detail. When foveal vision in the light is

TABLE 2.

A Comparison of Foveal with Parafoveal Vision Under Varying Conditions. (See Table 1 for further explanations.)

	More Myopic or Less Hyperopic in Parafoveal Vision					Less Myopic or More Hyperopic in Parafoveal Vision					
	4 or More					4 or More					
Value of x/σ	Reagent	No. of observations.	Difference in D.	3 to 4	Less than 3	Reagent	No. of observations.	Difference in D.	3 to 4	Less than 3	Equal
Foveal light With Parafoveal Light	I II VI VIII	40 20 74 40	.32 .28 .40 .45		IV,V,VII,X					III, IX	
Foveal dark With Parafoveal Dark	I II VI VIII	40 20 80 40	.65 .38 .37 .47	VII	X				IV	III, IX	V
Foveal light With Parafoveal Dark	I II V VI VIII	40 20 20 77 40	.67 .40 .28 .36 .32	VII	III					IX, X	IV
Foveal dark With Parafoveal Light	I II VI VIII X	40 20 77 40 20	.30 .26 .41 .60 .24	VII		III	40	.24	IV, V	IX	
Distribution of the 40 cases.	18			3	6	1			3	7	2

Considerable individual variation is seen, but it will be noted that in each comparison four or five of the ten reagents are distinctly more myopic or less hyperopic in parafoveal vision, while the reverse is true in only one case of the forty comparisons made. The less decisive cases including two which showed no difference are, as before, about equally divided and may be looked on as

contrasted with parafoveal vision in the light, or foveal dark, to use an abbreviated expression, is contrasted with parafoveal dark so that the only differing factor is the part of the retina used, the same four reagents show clear differences. In VI and VIII these are practically the same in the two cases, but in I and II where, as shown in Table I, there was a difference between parafo-

veal light and parafoveal dark the comparison of foveal dark with parafoveal dark gives a larger difference than the similar contrast in the light. The remaining comparisons show the same fact with the addition of positive results in two additional reagents.

These comparisons, therefore, show something of the difference already noted between light and dark, but the differences between foveal and parafoveal vision are so much greater as to be very striking, and the average of these four comparisons may with justice be taken as the difference between foveal and parafoveal vision.

To summarize, somewhat less than half of the people examined show significant differences of refraction amounting to .25D or .50D between foveal and parafoveal vision, and in practically all cases this difference is of the type showing more myopia or less hyperopia in parafoveal vision.

3. *Differences in refraction between foveal and various parafoveal portions of the retina.*

Having seen that there were marked differences between the fovea and part of the retina lying 5° temporally from it, experiments were next carried out to see if the same were true of points in different directions and at different distances from the fovea.

The first series was carried out as follows: The image was made to fall nasally from the fovea by shifting the fixation point to the left of the test object, and inferior and superior portions were tested by placing it above and below. In the two latter cases the triangular test object was laid on its side to make more accurate the measurement of the distance from its apex to the fixation point. The results of the tests in the four directions are given in Table 3.

Observations on only four of the reagents were available for this and in some of the cases only two reagents. It will be seen that in all of the significant cases and in most of the less decisive ones the observers proved, as before, more myopic in parafoveal vision. The differences, as in the cases that we have already considered, are between foveal and parafoveal vision. Altho not shown in the table the differences between foveal light and dark and parafoveal light and dark are none of them large or constant enough to be significant. Reagent I shows a clear difference in all directions, as do II and VIII in all the directions examined. Reagent VI showed a definite refractive difference on the temporal side in all four observations, but on the inferior, superior and nasal progressively less clear differences.

The amounts of the refractive differences with the corresponding differences in the focal lengths are given in Table 4 Since the observers were more myopic or less hyperopic in parafoveal vision, this would require that the posterior principal focus would be farther from the cornea by the distances in millimeters given in the table. It will be seen that

TABLE 3.

A Comparison of Foveal Vision with Parafoveal Vision in Different Directions from the Fovea.

	More Myopic or Less Hyperopic in Parafoveal Vision			Less Myopic or More Hyperopic in Parafoveal Vision.			Equal
x/σ	4	3	Less than 3	4	3	Less than 3	
Nasal	I, I, I, I II, II, II	II	VI, VI, VI, VI				
Temporal	I, I, I, I II, II, II, II VI, VI, VI, VI VIII, VIII, VIII, VIII						
Inferior	I, I, I, I	VI, VI	VI, VI				
Superior	I, I, I, I	VI	VI, VI			VI	

Only four of the reagents appear in this and the following table as the corresponding data were not obtained from the others.

TABLE 4.

The Refractive Differences in D Between Fovea and Parafoveal Region (5° from the Fovea in Nasal, Temporal, Inferior and Superior Direction) with the Corresponding Differences in Focal Length in mm. in the Eye.

Reagent.	I.	II.	VI.	VIII.	Average.
	D mm.	D mm.	D mm.	D mm.	D mm.
Nasal	.275 = .0914	.21 = .0698	.055 = .01825		.18 = .0598
Temporal	.50 = .1660	.33 = .1095	.385 = .1278	.44 = .1460	.414 = .1373
Inferior	.72 = .2390		.135 = .0448		.427 = .1419
Superior	.85 = .2820		.080 = .0265		.465 = .1542
Average	.586 = .1946	.27 = .0896	.164 = .0544	.44 = .1460	.371 = .1233

Nasal, temporal, inferior and superior represent the direction from the fovea centralis. For other explanations see Table 1.

the average of the four reagents in all the directions is .1233 mm. or about one eighth of a millimeter corresponding to a refractive difference of .37 D.

It is thus clear that the differences between foveal and parafoveal vision seen in the first tables is not an accident depending upon the point chosen but is true at least in some of the reagents of parafoveal regions in all directions, at a distance of 5°.

This point having been established the question arose whether the same differences would be found at other distances than the 5° first chosen. Observations were accordingly carried out at distances of 2°, 3° and 4° with reagents I and VI and the results are presented in Table 5.

The following values in diopters are obtained from averages for all comparisons between foveal and parafoveal visions in the above table:

	2°	3°	4°	5°
I	.175	.5375	.4375	.485
VI	.25	.35	.4875	.385

In the two cases furnishing enough data for this comparison the difference between foveal and parafoveal vision increases quite regularly up to 3 or 4 degrees. The horizontal diameter of the

TABLE 5.

A Comparison of Foveal Vision with Parafoveal Vision at Different Distances from the Fovea. This Data Was Obtained from Only Two of the Reagents.

Comparison of—	Reagent	Angular Distance from Fovea.			
		2°	3°	4°	5°
Foveal light with foveal dark,	I	.07 D.	.10 D.	.05 D.	.02 D.
	VI	.0	.0	.025	.01
Parafoveal light with parafoveal dark,	I	.08	.025	.175	*.35*
	VI	.0	.0	*.05**	.04
Foveal light with parafoveal light,	I	.17	*.475*	*.325*	*.32*
	VI	*.25*	*.35*	*.50*	*.40*
Foveal light with parafoveal dark,	I	*.25*	.50	*.50*	*.67*
	VI	*.25*	*.35*	*.45*	*.36*
Foveal dark with parafoveal light,	I	.10	*.575*	*.375*	*.30*
	VI	*.25*	*.35*	*.525*	*.41*
Foveal dark with parafoveal dark,	I	.18	.60	*.55*	*.65*
	VI	*.25*	*.35*	*.475*	*.37*

Where the value of x/σ is more than four the differences are in italics. In all such the observer proved more myopic or less hyperopic in the dark or in parafoveal vision, with the exception of the value starred.

fovea as given by different authors ranges from slightly over 0.1 mm. to 0.2 mm. But Dimmer ('94) gives 1.7 as the average of 6 cases. This would place the margin of the fovea about 3° from its center and at a point where our differences reach their maximum.

4. *The results obtained with other methods.*

The above results, which show a consistent difference in refraction between foveal and parafoveal vision in at least four out of ten observers, are supported by a limited number of experiments in which refraction was measured by other methods or under other conditions.

TABLE 6.

The Refraction in Foveal and Parafoveal (Temporal) Vision After Paralyzation of Accommodation by Homatropin (No. VI).

Test.	1	2	3	4	Average
Foveal (light) in D.....	—4.06 (6)	—4.024 (6)	—4.00 (6)	—4.00 (6)	—4.021
Foveal (dark) in D.....	—4.05 (5)	—4.024 (5)	—4.024 (5)	—4.00 (5)	—4.024
Parafoveal (light) in D...	—4.375 (6)	—4.625 (6)	—4.50 (6)	—4.50 (6)	—4.500
Parafoveal (dark) in D...	—4.65 (5)	—4.70 (5)	—4.55 (5)	—4.55 (5)	—4.612

	Average.
Foveal	—4.0227
Parafoveal	—4.5562
Difference	.5335

The figures in parenthesis indicate the number of observations.

In No. VI accommodation was paralyzed by homatropin and a series of measurements were made. The test objects were not the same as in the experiments above described but the difference in refraction between the fovea and a point 5° distant temporally is as marked as in the tables previously given, showing clearly that accommodation is not a causal factor.

A short series of preliminary experiments in which a partially illuminated arch seen from the laboratory window in the evening was used as a test object is here given. Though few in number these observations are interesting as they represent the conditions under which the eyes are normally used at night.

The test with the shaking disc.

This test was very difficult and needed much preliminary training. The test object and the part of retina experimented upon were not always the same, consequently the results were not uniform but the refractive difference between foveal and parafoveal vision is clearly apparent.

The test with the punctumeter.

The appearance and disappearance of a small hole or a spot on test card was adopted for determination of refraction. Two of the records from Nos. I and VI are given.

These experiments show a refractive difference between foveal and parafoveal vision always in the same sense, namely that the reagent was more myopic or less hyperopic in parafoveal vision than in foveal vision.

TABLE 7.

The Refraction of the Fovea and the Parafoveal Region (Temporal) with an Illuminated Arch as a Test Object. (No. 1).

Test	1	2	3	4	5	6	7	8	9	10	Average
Foveal in D.....	+.75	+.75	+.50	+.50	+.50	+.50	+.50	+.50	+.50	+.50	+.55
Parafoveal in D..	+.75	+.25	+.50	+.25	+.25	+.25	+.50	+.50	+.25	+.50	+.40
					(8 P. M., Feb. 6, 1918.)						
Foveal in D.....	+.50	+.75	+.75	+.75	+.75	+.50	+.50	+.50	+.50	+.50	+.60
Parafoveal in D..	+.50	+.50	+.50	+.50	+.25	+.50	+.25	+.25	+.00	+.25	+.35
					(Evening, Jan. 28, 1918.)						

It will thus be seen that the data obtained by different methods are concordant and the differences in refraction are such as would appear in any careful series of measurements.

portion, the clearest image will be formed correspondingly nearer the cornea, thus giving a condition of myopia or lessening the hyperopia.

In the present work it has been shown,

TABLE 8.

The Refraction in Foveal and Parafoveal (Temporal) Vision Tested with a Shaking Disc (I and VI).

Reagent.	I.	I.	VI.
Foveal in D.....	+.61 (10)	+.45 (10)	—4.109 (16)
Parafoveal in D.....	+.54 (10)	+.35 (10)	—4.656 (16)
Difference in D.....	.07	.10	.547

See Table 1 for explanation.

TABLE 9.

The Refraction in Foveal and Parafoveal (Temporal) Vision Tested with a Punctumeter (I, VI).

Reagent.	I.	I.	VI.	VI.
Foveal (light) in D.....	+1.899 (10)	+1.536 (10)	—2.297 (10)	—1.741 (10)
Parafoveal in D.....	+1.625 (10)	+1.112 (10)	—2.696 (10)	—2.779 (10)
Difference in D.....	.274	.424	.399	1.038

See Table 1 for explanation.

DISCUSSION.

In considering the results just presented we will endeavor to distinguish sharply between the observed facts and their interpretation. The present observations and the earlier observations of Jackson and Rayleigh have established a difference in refraction in many people between vision in intense or ordinary and in very weak illumination, or in other words between daylight and twilight or night vision. This difference is such that the observer becomes more myopic or, if hyperopic, less hyperopic in passing from the light into the dark.

Jackson considered this as due to the difference in the size of the pupil. Symmetric aberration is present in most eyes and this is usually of the type in which the refractive effect of the marginal part of the cornea and lens, which is usually excluded by the iris, is greater than that of the central part. When, in the dark, the greatly widened pupil allows light to enter thru this peripheral zone it is more sharply refracted, and if the amount of light thus entering is in excess of that entering thru the central

however, that while there are in some reagents small differences in refraction between foveal vision in the light and in the dark or between parafoveal vision in the light and in the dark, the significant differences lie between foveal and parafoveal vision. Before considering how such differences can be responsible for the differences between vision in daylight and in a dimly lighted room which formed the point of departure for the present discussion, let us restate the proofs for the above conclusion. In part of the experiments artificial pupils as small or smaller than the size of the pupil in the light were used without affecting the results. When homatropin was used and maximum dilation of the pupil was present the difference between foveal and parafoveal vision amounted to about .5 D, as much as under ordinary conditions. Here, of course, any influence of pupillary size is impossible.

Even without these special experiments the ordinary routine of observation would have excluded the effect of the size of the pupil. As already stated this was to take 20 alternate readings of

foveal and parafoveal vision in the light and to follow this with a similar set in the dark. In the first set of foveal and parafoveal observations in the light the size of the pupil, of course, remained unchanged, yet the difference in refraction was clear and definite and much greater than that between the foveal observations of this set and those of the next with widened pupil in the dark.

If, then, the refractive difference is chiefly one between foveal and parafoveal vision, why was it first observed as a result of a change in illumination, such as passing from daylight to a dimly lighted room? The explanation is not difficult. As is generally known (Piper '03 and others) the parafoveal region in dark adaptation becomes more sensitive to light than the fovea, a circumstance which accounts for the fact that a very faint star often disappears when looked at, to reappear when the eye is directed a little to one side. Simon ('04) has further shown that when feebly illuminated points are looked at, in exclusion of other sources of light, parafoveal points are used by preference in fixation, the distance and direction of these from the fovea depending upon the particular eye examined and the degree of dark adaptation. In other words, the physiologic center of the retina, or preferred fixation point, migrates from the center of the fovea with bright illumination, to a region 2° or more distant in dim light. This same parafoveal region under ordinary light conditions can become the object of our attention only by special care in fixation; and the limitation of the number of stimuli in the visual field as in our experiments in the dark room. These facts may be verified by any one who will carefully observe in a very dim light fine objects such as the branches of a tree. These may be more clearly seen if not "looked at" directly; and if an effort is made to see fine details it will be noted that the object is not in the same part of the visual field that is used in daylight vision, that is to say, a parafoveal region is being used for fixation. Daylight vision is therefore foveal vision, vision in dim lights is to a greater or less degree parafoveal vision; thus the present experimental results and the original observations in light and dark are in accord.

It is unnecessary to return to the point, already discussed, of the relative importance of the differences between vision in light and dark and between foveal and parafoveal vision. Small differences due solely to the amount of light appear in perhaps 10 to 20 per cent of the reagents, larger differences due to the portion of the retina used appear in about 40 to 45 per cent. The general observation of refractive difference between light and dark is due to the combined effect of these two differences, which are both in the same direction. Before considering the possible causes of these it may be well to point out some of the practical effects of the entire difference.

Jackson in the paper previously cited has pointed out one *effect of this difference* in causing eyestrain, where in near work in bright light the contracted pupil causes increased hyperopia. It may also be pointed out that the refractive difference under discussion has an important practical bearing on the correction of the vision of persons who have responsible positions involving vision in dim lights, as railway engineers, firemen, signalmen, ship's lookouts and the like. If such persons from ametropia wear glasses of any type it should be borne in mind that they may show marked enough differences in refraction between light and dark (up to 0.5 D, as in some of the persons here examined) to make glasses fitted in the ordinary way quite unsuitable. This for instance was found to be the case with one of the writers (W.) where a —.5 D lens in addition to the usual correction gave very greatly improved vision out of doors in the evening. Care should therefore be taken to test such persons in a dim light to see if differences exist, or if this is impractical, pains should be taken not to overcorrect (not to give too strong a convex or too weak a concave lens) as this will tend to accentuate the difficulty of vision in dim lights.

That differences in refraction due to changes in the size of the pupil may affect the results obtained with the retinoscope was pointed out by Jackson. That differences between foveal and parafoveal vision may also enter to complicate

the result seems probable, as in consequence of the practice of having the person observed fix the brow of the observer or the upper edge of the mirror, it is a parafoveal region that occupies the center of the illuminated pupil. Detailed study of the differences found between the results of retinoscopy and subjective examination while still under the effect of the cycloplegic might show them to be differences between foveal and parafoveal vision; but these data were not available and there has been no opportunity for carrying out such tests.

We may now turn to a consideration of the *causes of these differences.* In the case of the differences between vision in the light and dark where the same part of the retina is used in both, Jackson's explanation of the effect of the widened pupil, already detailed, seems adequate; tho it is perhaps difficult to see why those reagents showing this difference in foveal vision and therefore presumably exhibiting an optical system of the type suggested, should not show the same difference in parafoveal vision, but as noted this was not the case.

Before discussing the possible causes of the observed difference between foveal and parafoveal vision it will be well to outline these conditions clearly. The differences are such that if the refractive surfaces should remain unchanged the posterior principal focus would lie more distant from the cornea (or nodal point) in parafoveal than in foveal vision, and would accord with an anatomic arrangement placing the sensitive elements further from the cornea at a distance of 5° from the fovea than in its center.

If on the other hand the sensitive elements are all equally distant from the nodal point the refractive surfaces must undergo changes such that they become more strongly refractive in parafoveal vision so that with the same correction the posterior principal focus lies in front of the sensitive elements.

A third possibility must be considered. It is possible that neither the anatomic arrangement nor the refraction varies between the fovea and the parafoveal region to any significant extent, and that the differences are physiologic—differences in the use that is made of similar retinal images by different sensitive elements. Careful observation of the test object, particularly in the dark, shows, for instance, the presence of a halo due to the more sharply refracted portions of the cone of light which, as is known, shows this form of symmetric spherical aberration. It might be considered possible that this halo, which increases in size as a more converging lens is used, could stimulate the more sensitive parafoveal region in the dark adapted eye; and hence lead to the choice of a less converging lens. But the conditions are reversed in the light adapted eye where the foveal region is the more sensitive. For this reason the differences would be neutralized in the various comparisons and could hardly become a factor in the results obtained.

A purely objective method of determining the refraction would have been highly desirable but we are unacquainted with any method capable of precise localization in the retina and at the same time accurate enough to give such slight differences of refraction as those here dealt with. According to Landolt ('04) it is not very easy even for a good observer to give in parafoveal vision the definite moment at which he sees the object most clearly. This well known difficulty of observation was of course encountered; but that it was not the determining factor in the results is indicated by the fact that the variability of the parafoveal observations was not markedly greater than that of the foveal. The average standard deviation of the ten observers for foveal vision was .06 D, for parafoveal vision .086 D.

That the less keen form sense of the extrafoveal region leads to some difference in the utilization of the image is not impossible, but in the absence of more positive evidence we will disregard it. Certain other physiologic factors i. e the possible change of the length of cones and rods, the pigment migration, the decolorization of visual purple, etc., changes most marked between light and dark adaptation where the observed refractive differences were least, can not, therefore, be causal factors and need no further consideration.

Turning to the physical factors which must be considered here, the effect of the size of the pupil would early suggest itself. This, of course, differs only between light and dark adaptation, while the difference in refraction is found between foveal and parafoveal vision, without change in adaptation, consequently the size of the pupil can not be a determining factor. Tests were, however, made with artificial pupils of 2, 3 and 4 mm. diameter, but we failed to find any observable effects. It is interesting to note that Cobb ('15) working with an even wider range of pupillary diameter (2.8 to 5.6 mm.) failed to find any marked effect on visual acuity.

The accommodation of the eye was practically excluded on account of the arrangement for the experiment already discussed, but as a precaution we used homatropin and found that the cessation of accommodation made the observation much more decisive without affecting the results in any way (see Table 6).

If we look at the fixation lamp, the light from the test object situated 5° from the former falls obliquely on the refractive surfaces of the eye. This would cause shortening of the posterior focal length as compared with light falling perpendicularly (Tscherning '03), and would necessarily be corrected by less converging lens. The angle α of Donders in the four cases under consideration (Nos. I, II, VI, VIII) was determined as follows:

Direction of the visual line as compared with the optic axis:

		Nasal	Superior	Inferior
I	(R. eye)	8° 8′	4′	
II	(R. eye)	5° 57′	41′	
VI	(R. eye)	6° 10′	...	43′
VIII	(R. eye)	4° 47′	1° 19′	

As is clear from this table the fovea centralis is situated on the right side of the optical axis. Thus the above assumption would explain the differences when the fixation point is placed on the right side of the test object, for the rays from the latter would fall more obliquely than in foveal vision; and focus before reaching the retina, thus necessitating the correction by less converging lens. But when the fixation point is placed on the left side of the test object, the rays from the latter would fall more perpendicularly than in foveal vision and be corrected by a more converging lens. The fact is, nevertheless, that a less converging lens was also selected in this case. Besides this the amount of refractive difference did not vary in proportion to the amount of angle α (compare with Table 5). Furthermore in the case of No. I the angle α in the vertical meridian was very small as in the other three cases, but the refractive difference was very large. Those considerations make the above assumption that the differences of refraction are due to differences in obliquity of the incident light, highly improbable.

According to the investigations of Golding Bird and Schaefer ('95), and Dimmer ('94) the diameter of the fovea centralis does not exceed .2 mm. and therefore a parafoveal retinal region 5° from the fovea would lie outside of the latter.

The difference of refraction which we have mentioned above might be ascribed to the difference in distance of the center of the fovea and the parafoveal point from the nodal point. The radius of the globe is about 12 mm. while the nodal point is more than 15 mm. from the retina, so that the hemisphere formed by the posterior part of the globe would lie everywhere somewhat in front of a similar hemisphere described about the nodal point and also passing thru the retina where it cuts the optic axis. As the fovea is situated closer to the optic axis, the distance of this point from the nodal point will be greater, tho in a very slight degree, than that of the above parafoveal point. On this assumption parafoveal vision would be corrected by a more converging or a less diverging lens, but this is just contrary to the results obtained, hence the above assumption is either incorrect or its effects masked by more important factors working in the opposite direction.

The refraction of the retina itself is worth discussing. Light from objects accurately seen enters the retina from the vitreous with such a degree of convergence as would bring it to focus in

the outer layers of the light sensitive elements. The posterior focal length of such rays in the retina is, therefore, the thickness of retina or slightly less. Any degree of curvature greater or less than that of a sphere of that radius would cause bending, if the retina is more or less dense than vitreous. If there was any considerable refraction by the retina the parafoveal region would be one of great astigmatic distortion because of the toric surface offered by the rim of the foveal depression. The visual acuity should then suffer a sudden drop in this region to rise again somewhat beyond it, but there is no evidence of this. Parallel lines also should appear very different above and to the side of the fovea which is not true. We may therefore dismiss the possibility of the refraction of the retina as a factor in the refractive differences observed.

Ametropia might be thought to play some influential part in the results. In four cases under consideration one was hyperopic, another was myopic and the rest were almost emmetropic, but the refractive differences were found always in the same sense. Therefore these refractive anomalies are not directly connected with the observed differences. Extremely high myopia involving posterior staphyloma (Otto '97) was not present in any of the subjects.

Finally the anatomic structure of the eye should be considered. The difference of refraction established may be due to individual difference of the shape of eyeball, entailing a corresponding difference in the curvature of retina. But to consider the difference as individual would seem incorrect as it is too regular (always in the same sense) and too frequent (four times out of ten).

It is also possible that different sensitive elements are functioning in foveal and parafoveal vision, as their histologic differences suggest. But this is not at least the principal cause because the refractive difference did not depend on adaptation.

Greeff ('00) and others found that cones decrease in length from the fovea centralis to the periphery of the retina. Near the margin of the fovea they are 21μ and at the periphery of the macula lutea 31μ shorter than those at the central part of the fovea. Calculations from the photograph given by Johnson ('96), and the diagram by Fritsch ('08), show that the cones at about 3° distant from the fovea are respectively .068 mm. and .04 mm. shorter than at the center of the fovea. The refractive difference between foveal and parafoveal vision which was established gives .1095 to .1660 mm. on the temporal side of retina, from the fovea (see Table 4), the average of all measurements being .1233 mm. i. e. double or treble the amount of difference given by these investigators. In reality it is greater than even the whole length of a cone (Greeff and others) of the fovea. This histologic peculiarity in the foveal cones does not therefore account for the fact.

The remaining anatomic feature which would explain the fact is the external fovea. Whether such a cupping of the external surface of the entire retina is normally present or is an artefact has been a subject of controversy. It has been carefully described by Golding Bird and Schaefer and flatly denied by Greeff and Dimmer as a normal feature of the retina.

Many investigators, Cicaccio ('80), Wadsworth ('81), Schultze, Fritsch ('08), Salzmann ('12) agree, that the membrana limitans externa is bent inward due to the greater length of the foveal cones; and Fritsch, who denies the existence of an external fovea, figures not only this cupping of the membrana limitans externa, but also a difference in level of the tips of the cones and even of the pigment layer; which while it is not called external fovea seems to differ only in degree (30μ) from the structure described by Golding Bird and Schaefer.

The cupping was described by Golding Bird and Schaefer as measuring .133 mm. in depth and less than 1 mm. in diameter; both measurements would of course vary in individual cases. This measurement of the depth of the external fovea is very near to the value which we obtained as an average of the difference of the focal length between foveal

and parafoveal vision .1233 mm. (see Table4). The results in case No. 1 where definite differences were established in all four directions from the fovea combined with the conclusions shown in Table 5, that the difference between foveal and parafoveal vision increased gradually with the increase of the distance from the fovea, would especially favor the existence of such structure. The results in case No. II also suggest that it is very probable. In case No. VI the definite difference was limited to the temporal side but suggested in the other three directions. Case No. VIII gave a definite difference on the temporal side, which side only was examined.

As far as we know this is the only evidence from the living eye supporting the conception of an external fovea and while limited in extent and apparently subject to individual variation it is certainly not to be described as an artefact.

With due regard to the uncertain status of the "external fovea" and to the individual variation shown both in the anatomic studies (Fritsch has insisted on the great individual variation in many features of the retina); and in the results here obtained it seems necessary to assume that the structure of the macula in many eyes is such that the essential parts of the light perceiving elements lie more distant from the cornea in one, two, three or all directions from the fovea than in the fovea itself. This we may do without prejudice as to the name by which it may be called, and leave its further fate to progress in the difficult field of retinal histology or to measurement of the living eye of the type here attempted.

That the problem is complicated is apparent and it is not unlikely that several of the factors mentioned or others here neglected may be involved; but we feel that the most important element is the anatomic arrangement of the light perceiving structure of the retina.

CONCLUSIONS.

1. Small differences of refraction between foveal vision in the light and in the dark, and between parafoveal vision in the light and in the dark, are shown by 10% to 20% of the reagents examined.

2. A definite refractive difference between foveal and parafoveal vision is shown by 40% to 45% of the reagents. The difference between the fovea and a spot 5° excentric (temporally) from it, amounts to from .33 D to .50 D, the parafoveal region being more myopic or less hyperopic than the fovea.

3. The observation that glasses suitable in bright light become less so in dim light accords with the facts established.

4. These facts have a practical application in the correction of refractive errors. Care should be taken in those cases where the person must distinguish signals in dim light (railway engineers, firemen, signalmen, ship's lookouts, etc.) to see that the glasses given are suitable for twilight vision, as in a certain percentage of cases the correction under ordinary conditions is distinctly different from that in dim lights.

5. A possible explanation is offered by the present facts for the differences found between the refraction as determined by the retinoscope and by subjective methods under otherwise similar conditions.

6. The differences found between foveal vision in the light and in the dark or parafoveal vision in the light and in the dark seem to be best explained by Jackson's theory of the influence of the widened pupil in the dark adapted eye in admitting the peripheral more strongly refracted rays.

7. The difference between foveal and parafoveal vision does not seem to us to be due to optical factors affecting the incident light in the two cases, but is more satisfactorily explained by the assumption that the membrana limitans externa bulges outwards (away from the vitreous) in one, two, three or all directions from the fovea. In the latter case the conditions are those which have been described by histologists as an external fovea.

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ON THE CONJUNCTIVITIS MEIPOMIANA (ELSCHNIG).

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A report of three cases of this condition with discussion of its characteristic features.

In November of 1913 I had an opportunity to examine a patient, a man aged 63, who was suffering from a chronic conjunctivitis with thick yellowish discharge.

The conjunctivitis differed, however, evidently from any other known chronic form, especially in regard to the localization of papillary growth on the conjunctiva.

Details of the disturbances of the eyes were as follows:

The eyelids were externally slightly swollen on each side.

An examination of the conjunctiva showed immediately the origin of the above mentioned discharge.

It flowed out, by the compression on the tarsus, from somewhat swollen orifices of the Meibomian glands. These were apparently enlarged, due to their abundant contents of secretion; and could be observed as yellowish bodies through the greyish cloudy thickened conjunctiva.

In a further observation of the palpebral conjunctiva, which was now free from foamy secretions on its surface, a strong papillary growth was observed, which came most apparently to sight, if the conjunctiva was observed obliquely.

The localization of that papillary growth varied so far from the ordinary forms that it was not localized and most remarkable beyond the upper part of the tarsus; but was most intense in the neighborhood of the lid margin, diminishing gradually towards the fornix where it almost disappeared.

The disturbances of each lid were just the same in regard to their extension and intensity.

The bulbar conjunctiva was normal.

The skin of the lids, eyelashes and the roots of the latter, showed in no wise pathologic.

Some smear preparations from the discharge of the Meibomian glands were made for the sake of microscopic studies. They were obtained by means of compression on the tarsus, and stained with sudan III, haematoxylin-eosin and also after the Gram method.

The discharge consisted chiefly of solid fat containing some fatty degenerated epithelial cells of the Meibomian glands, and their ducts.

No bacteria were to be found in it.

The affection healed after three months by daily massage of the Meibomian glands, in order to remove their secretion, combined with washing with strong sublimate solution.

Three months later another case came under my observation, which might be considered as a light form of the former case, in a man aged 48 with optic atrophy.

The disturbances of the conjunctiva were not so severe as in the former case, and were limited to the left side only.

The papillary growth was localized also simply on the lower part of the tarsus, near the free margin of both lids.

Hyperemia of the conjunctiva was somewhat noticeable.

Discharge obtained from the Meibomian glands was sterile.

The two cases above described led me at that time to believe in the existence of a peculiar form of chronic conjunctivitis which is characterized by a hypersecretion of the Meibomian glands, accompanied with a specific localization of papillary growth on the conjunctiva.

I had reserved, however, the report on these cases for further experiences.

But soon after I was astonished to find a description published by Elschnig several years ago, regarding the above

mentioned form of chronic conjunctivitis, under the name of Conjunctivitis Meibomiana, of which I was until then ignorant.[1]

The clinical features of my two cases were so coincident with the description of Elschnig that they might be considered completely identical with the Conjunctivitis Meibomiana in Elschnig's meaning.

Some months later I saw a further case of that conjunctival affection in a man aged 24.

In this case the affection was localized on all the lids and showed its typical appearance on the palpebral conjunctiva, as already mentioned.

The discharge from the Meibomian glands was examined for microorganism but in vain.

The affection improved much by daily application of massage on the tarsus; but after three months the patient had to leave for Formosa owing to his business. The three cases above[2] described were reported at the time.

The essential features of the conjunctivitis Meibomiana are the typical localization and spreading of the papillary growth on the palpebral conjunctiva, and the stagnation of the secretion of the Meibomian glands, on account of hypersecretion.

This functional disturbance of the Meibomian glands seems only to have causal reference to the chronic inflammation of the palpebral conjunctiva, especially most intense on the tarsal region; for the inflammation can only be subdued by daily massage of the Meibomian glands in order to remove their secretions, and without this procedure it can never be healed.

The discharge of the Meibomian glands is usually sterile, as all my cases showed; and it tells us that the conjunctival affection must be ascribed to the functional excess of the Meibomian glands but not to infection.

There may occur, however, naturally a secondary infection during the course of the affection, as was observed in a few cases by Elschnig.

It seems doubtful if the cases of Sylla[3], which have been reported under the name of conjunctivitis Meibomiana, were genuine cases of the disease described by Elschnig.

They resemble rather subacute or chronic chalazion, so far as the pathogenic bacteria were found in his cases.

It seems to me that little attention is paid to the existence of this chronic form of conjunctivitis from the side of the ophthalmologist, for the reports concerning the affection are very few, so far as I can find.

This might depend naturally upon the rarity of that disease; but also upon the ignorance of it; so that I offer this short report in order to awaken a renewed interest of the specialist in this disease.

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METASTATIC ENDOPHTHALMITIS ASSOCIATED WITH EPIDEMIC CEREBRO-SPINAL MENINIGITIS.

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Report of a case with microscopic examination of the eyeball. Read before the Central Texas Medical Society at Waco, January 8th, 1918.

The history of this case is presented for two reasons. First in order to make a suggestion as to treatment, and second to exhibit an histologic study of the shrunken globe which, while contributing nothing new to the pathology, corroborates in an interesting fashion many of the earlier findings.

Metastatic endophthalmitis as a complication of epidemic cerebro-spinal meningitis is said to be of frequent occurrence and to be "distinguished by its comparatively mild course." The percentage according to Knapp[1] being from 4 to 5. Uhthoff[2] also gives the percentage from 4 to 5 and states that "it is usually unilateral but that occasionally both eyes are simultaneously affected." From what I can learn from a review of recent literature I doubt very much if a careful analysis of the statistics of the epidemics occurring during the past few years in this country would show such a high percentage of metastatic endophthalmitis. As regards the statement that it is a mild process, a study of the reports of individual cases which have been described in detail, and my own experience with the present case, leads me to believe that this is one of the many inaccuracies that appear in text books and are passed on from one author to another.

Dr. Allen Greenwood[3] in discussion at the A. M. A. in 1913 says, "In the epidemic in Boston in 1908 it was not true. The cases of metastatic ophthalmia were extremely severe. Most of the patients with metastatic ophthalmia died, but the severity was marked. But one of the patients showing metastatic ophthalmia lived and he had phthisis bulbi in the involved eye." That these cases of purulent endophthalmitis are of metastatic origin and not the result of direct transmission through the optic sheath has been convincingly established by the observations of Axenfeld, Mayou and others. "The organism is conveyed to the eye by the blood stream and not by a direct spread from the meninges" (Collins and Mayou).[4] Axenfeld[5] states "Till now, at least, there is no certain case known of infection of the interior of the eye from the optic sheath." Whether the site of the septic embolus is in the retina or uvea is of no practical value from a clinical standpoint, for when seen the process has usually spread to the vitreous and there is no view of the fundus to be obtained. It is interesting to note, however, that Axenfeld states that when the invasion is into the retina both eyes are affected, and when into the uvea it is unilateral.

The important facts are the mode of the invasion, and the presence of bacteria in the eye. The presence of the organism has been difficult to demonstrate for, as Axenfeld[5] states, "Meningococci in the infected eye rapidly die out and when the eye is available for examination they can no longer be demonstrated." He says, "However their presence has been definitely proved in cases." Lt. A. L. Weakley, R. A. M. C.,[6] in the British Medical Journal, January 8th, 1916, reports a case of metastatic endophthalmitis accompanying epidemic cerebrospinal meningitis in which hypopyon was present and paracentesis was performed. A pure culture of gram negative diplococci was grown from the pus removed. Hanford McKee[1] in the Ophthalmic Record, Sept., 1908, mentions a culture of gram negative diplococci grown from the pus in the anterior chamber of the eye of a child dead

of epidemic cerebro-spinal meningitis which organisms coincided in all particulars with the gram negative diplococci isolated from the child's cerebro-spinal fluid, meningococci.

In spite of the fact that metastatic endophthalmitis of meningococcic origin is spoken of by authoritative writers as a mild process, these cases nearly always go on to atrophy of the eye and occasionally there is rupture of the globe.

FIG. 1.

Section of whole eye showing unequal thickening of sclera and cornea. Fusiform swelling of retina, optic nerve, and sheaths. Stained hematoxylin and eosin.

REPORT OF A CASE.

April 27th, 1917, I was called in consultation by Dr. William Gammon to see the eye of a boy 17 years of age, who was suffering from epidemic cerebro-spinal meningitis. The attack had been unusually severe and he was covered with hemorrhagic spots, many of which were confluent. It was the fourth day since the disease had been recognized. He was conscious and his general condition was very good. Meningococci had been found in the spinal fluid and the blood.

Upon examination I found the right eyelids swollen, the episcleral tissue injected giving the globe a dull lilac hue. The cornea was faintly hazy, the pupil measured 4 mm. and the iris responded sluggishly to light. Through the pupil was seen a white mass behind the lens. Vision equal light perception.

The left eye presented no abnormal change.

FIG. 2.—DESCEMET'S MEMBRANE THROWN INTO FOLDS. POSTERIOR TO CORNEA IS SEEN LAYER OF EXUDATE FROM IRIS, TO WHICH IS ATTACHED LENS CAPSULE. LENS EPITHELIUM IS SEEN ATTACHED TO CAPSULE. STAIN, HEMATOXYLIN AND EOSIN.

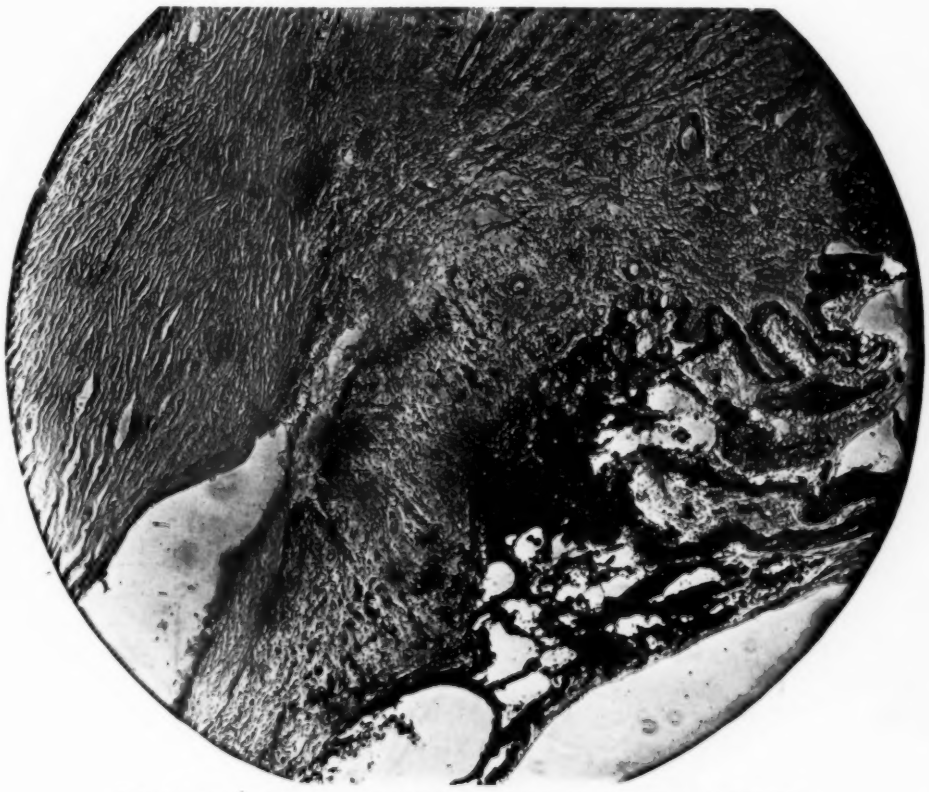

FIG 3.—CILIARY BODY AND PROCESSES. STAIN, HEMATOXYLIN AND EOSIN.

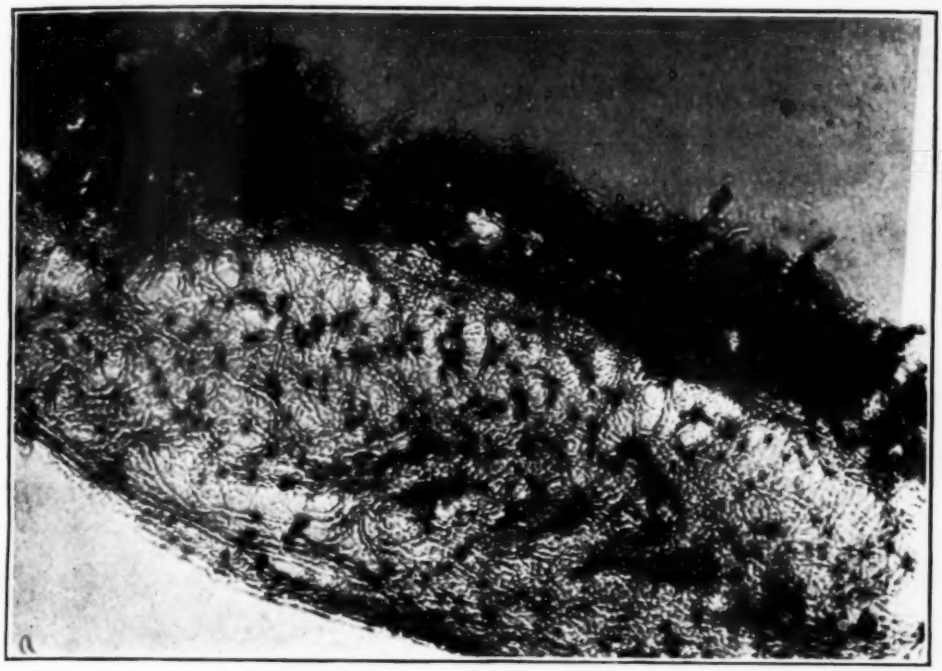

FIG. 4.—RETINA. STAIN, HEMATOXYLIN AND IRON

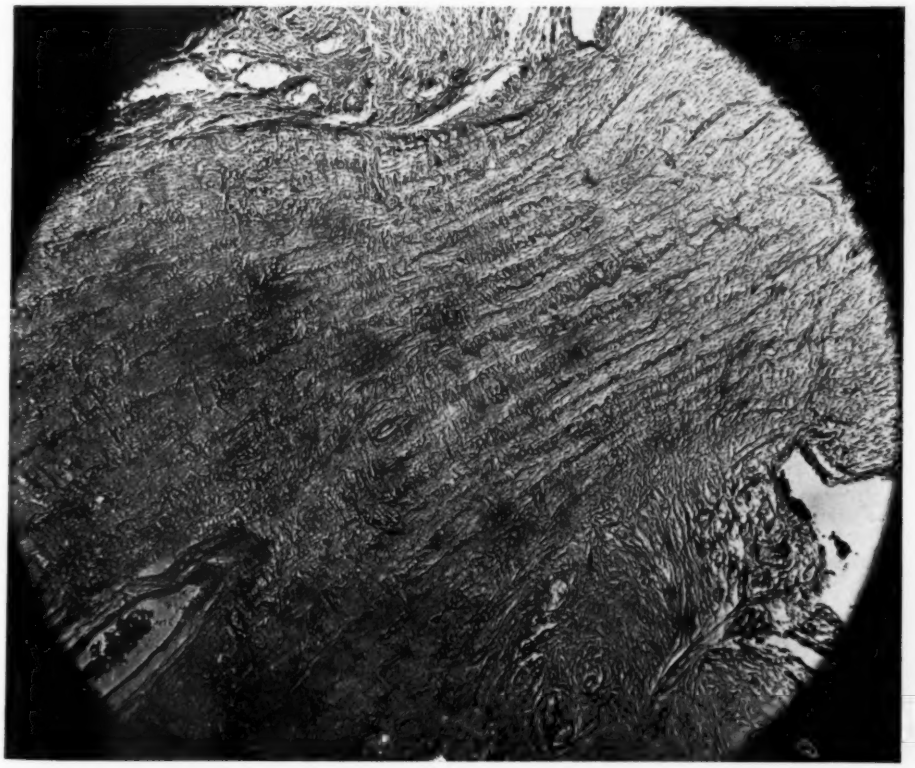

FIG. 5.—OPTIC NERVE AT ENTRANCE TO EYEBALL. STAIN, HEMATOXYLIN AND EOSIN.

Atropin was instilled into the right eye. The following day the cornea was quite hazy, the anterior chamber contained pus and the white mass in the vitreous was well seen through a widely dilated pupil. Photophobia was severe and there was active lacrimation. He had had six injections intraspinally of 20 cc. each of Mulford serum, and the spinal fluid was now clear and free from organisms.

On April 28th the condition of the eye was much worse and it seemed to be going on rapidly to destruction. He was now given intravenous injections of the serum. Two injections daily of 20 cc. each were given for three days. The day following the first injection the eye was somewhat clearer. On the second day the cornea had cleared and the anterior chamber was free from pus. The globe had lost the sickly lilac hue, and had become bright red, showing that an active effort was being made on the part of the tissues to rid the eye of the invasion. The day following, the third day of intravenous injections, the eye showed still more marked improvement and the white mass in the vitreous had receded some distance and movements of the hand could be seen.

He now developed a serum reaction and it was necessary to discontinue the injections. During the next few weeks his general health improved rapidly but the eye remained the same. Atropin was continued and the eye protected from the light. Finally the eye began to shrink and at the end of six months had become very small and disfiguring. Altho the eye was now quiet the patient desired for cosmetic reasons to have it removed. On November 20th, 1917, the eye was enucleated. The capsule of Tenon, muscles and sclera were matted together, making careful dissection necessary in their separation, in spite of which he has an excellent stump.

The rapidity and degree of the improvement was so great following the intravenous injections, that I am fain to believe that had they been given at the first sign of involvement of the eye, that the process might have been stopped before great changes had taken place and the eye saved. The purpose of this report is to suggest that intravenous injections of serum be given at the first suggestion of eye complication and before as a preventive measure in those cases accompanied by numerous hemorrhages into the skin.

DESCRIPTION OF THE GLOBE.

Diameters: Sagittal 19 mm. Transverse 19.5 mm. The sclera shows great thickening, measuring 4 mm. near the posterior pole and tapering to 1.5 mm. near its anterior extremity. The cornea is opaque, the lens partially absorbed and the retina completely detached and presenting a fusiform appearance near the optic nerve entrance. See Fig. 1.

Microscopic appearances: In some sections the corneal epithelium is represented by a thick layer of modified epithelial cells. In others it is absent, and is replaced by a layer of fibrous tissure, which is connected with Bowman's membrane by a series of fibres perpendicular to it, placed at comparatively regular intervals producing a reticular arrangement. Bowman's membrane is fairly well preserved and presents a wavy outline dipping down into the substantia propria. The substantia propria has been converted into an irregular mass of fibrous tissue through which course many blood vessels. There are scattered throughout fixed cells, and what appear to be corneal spaces.

Descemet's membrane is preserved in its entire extent, which, on account of the shrinking of the other portions of the eye, has caused it to be thrown into many folds. Its endothelial lining remains as an irregular row of cells. Immediately behind the endothelial layer of the cornea there is a dense mass of exudate proceeding from the iris, and attached to the posterior surface of this exudate is the lens capsule with the lens epithelium attached. See Plate XII, Fig. 2. The capsule when traced around is seen to be broken posteriorly and occupied by a much shrunken and partly absorbed lens. In the lens

near the equator are numbers of leucocytes.

The angle of the anterior chamber is in part obliterated, by adhesions between the iris near its base and the cornea. The ciliary body and processes are fairly well preserved but show a great deal of round cell infiltration. See Plate XII, Fig. 3. The choroid is little changed but is separated from the sclera except at the optic disk.

Immediately posterior to the lens capsule is an area of inflammatory exudate, in which there is a large mass of round cells and to which is attached the retina. (Fig. 1.) It was here that the white mass was located that was seen through the pupil shortly after the eye became inflamed, and it suggests that the septic embolus may have lodged in the anterior part of the retina and pus developed at this place in the vitreous. The retina is completely detached and disorganized. See Plate XIII, Fig. 4. There are places in which parallel rows of densely stained nuclei are seen, which are probably the remains of the nuclear layers. As the optic nerve is approached the fusiform mass seen by low magnification is seen to be composed of fine fibres which are continuous with the fibres of the optic nerve. Their arrangement does not appear to be the result of papillitis but more that of a drawing forward of the fibres associated with the inflammatory changes in the retina. The retrobulbar portion of the nerve shows well marked degeneration. The optic nerve sheathes and intervaginal space are apparently normal. Plate XIII, Fig. 5.

My thanks are due to Dr. Henry Hartman of the Department of Pathology of the University of Texas for the preparation of the specimens and to Dr. William Keiller, Professor of Anatomy, for assistance in their study.

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QUININ POISONING, ITS OCULAR LESIONS AND VISUAL DISTURBANCES.

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This analytic review of the literature of the subject combined with the personal experience and conclusions of its author constitutes a clear statement of our present knowledge of the subject. It is of especial practical value at this time.

Concluded, with bibliography.

THE PATHOLOGY OF QUININ POISONING.

One of the earliest, if not actually the very earliest, of the communications on this subject is that by Brunner (1882), who discussed the mechanism of quinin blindness and suggested the following possibilities: (1) That the alkaloid in the blood directly attacks the end organs of the retina; (2) that the retina is starved owing to the ischemia; (3) that the optic nerve is primarily attacked; (4) that the blind-

ness is due to gross lesions, either inflammatory or hemorrhagic; (5) that the primary lesion is cerebral in origin. After a careful consideration of the question, he came to the conclusion that the seat of the lesion was a peripheral one, and that the amaurosis was dependent upon the retinal ischemia, tho inflammatory changes of the retina might play a secondary part. Ten years later, de Schweinitz experimented on the same lines (without knowledge of Brunner's work), and carried the matter still further by producing quinin blindness in dogs, and submitting the brain and eyes of the animals to careful anatomic examination. In the main, he confirmed Brunner's findings, but was disposed at the time to lay some stress on inflammatory changes in the walls of the vessels of the optic nerve. He thought that the vasoconstriction was due to the action of the quinin upon the vasomotor centres, and he drew special attention to the selective action of this drug upon the special sense organs of sight and hearing.

About the same time (1891) Barabaschew made a contribution to the subject which was as venturesome as it was interesting, since his experiments were made on human beings. With doses of 0.3 to 0.6 grms of quinin, he found no observable results in sound subjects free from idiosyncrasy; 1.2 grms produced annoying symptoms, though not the same in all cases; 2.4 to 3.6 grms doses resulted in the appearance of marked symptoms, analogous to those of severe quinin amaurosis; these included all the classic signs of the condition. He was able to draw an early clinical picture of extreme interest, and one which for obvious reasons has evaded the attention of the practicing clinician. Its leading features are as follows: (1) There is an increase of visual acuity following the dose and lasting for some hours; (2) there is an early constriction of the pupil, which lasts only a short time and then passes into dilatation; (3) the pulse at first is rapid, later it is slow; (4) the sensibility of the cornea is first increased and subsequently diminished; (5) there is an early slight rise of temperature followed by the usual fall. In one case, there was amaurosis for half a minute, which returned ten times after intervals of from 5 to 10 minutes, the sight being normal in between the attacks. Each attack of visual disturbance was attended by a constriction of the visual field. An irregularity of the heart and pulse accompanied these changes and suggested an affection of the vasomotor system. He raised the question whether the contraction of the retinal vessels was a central vasomotor action, or was due to the direct influence of the quinin, circulating in the blood, on the vessel walls. He attributed the contraction of the visual fields, to the diminished supply of blood to the peripheral parts of the retina, and to the consequent loss of functional activity in those regions.

Behse injected bichlorid of quinin into animals subcutaneously and found pallor of the optic disc and contraction of the retinal vessels; he was struck by the fact that the dose required to produce toxic symptoms differs as widely in animals as it does in man. He described changes in the coats of the vessels, and thrombosis of the retinal artery amongst other phenomena, which he encountered. He thought that the primary change was a spasm of the vessel walls, followed later by organic alterations, associated with permanent loss of vision.

A new note was struck by de Bono (1894), who made a number of experiments on frogs. In these animals, there is, under normal conditions, a movement of the pigment granules in the retinal epithelium, as a result of the stimulus of light. De Bono found that if a toxic dose of quinin were first administered by injection, this normal response to the light-stimulus was abolished; he concluded, therefore, that the cells themselves had been directly poisoned by the drug, and proceeding to apply his results to human beings, he deduced that the cause of the amaurosis was not to be sought in the ischemia present, but in the quinin intoxication of the terminal elements of

the optic nerve in the retina, viz., the rods and cones. He farther pointed out that, inasmuch as the ischemia may and often does persist, long after the return of vision, it is not reasonable to attribute the blindness wholly to it.

De Schweinitz, in 1896, brought out his classic volume on "Toxic Amblyopias," in the course of which he discussed the pathology of quinin poisoning at length. Again, in his remarks on Holden's paper, he gave it as his opinion that the ischemia of the retina was due to the action on the vessel walls of the quinin circulating in the blood.

This brings us to the valuable paper by Ward A. Holden (1897-98), who examined the fresh retinas of quinin poisoned dogs under Nissl's methylene-blue and eosin, and the optic nerves of the same animals by the Marchi osmic-acid staining method. He concluded (1) that the pathologic process was one of degeneration of the nerve fibre and ganglion cell layers of the retina, due to insufficient nutrition determined by the constriction of the retinal arteries; and (2) that this degeneration was followed by an ascending atrophy of the optic nerve fibres, which extended up to their terminations in the external geniculate body and pulvinar of the thalamus. He found no lesions in the other layers of the retina. To his mind the blindness could be satisfactorily explained by the indirect action of the quinin in producing spasm of the retinal vessels, and thus diminishing the nutritive supply of the inner layers, and he questioned any direct toxic influence on the nervous elements.

The next land-mark in the literature of the subject is Birch-Hirschfeld's paper in 1900. He found that the doses, which were on record as producing quinin amblyopia, varied from 0.75 grms up to 30 grms. He thought that Holden's findings of changes in the ganglion cells were not wholly correct, and that an element of confusion had been introduced into them by post mortem changes. His examination showed the following alterations in the cells of the retina: The ganglion cells were shrunken; their boundaries were indistinct; the protoplasm stained deeper than normally with thionin; vacuolation was present, and there were changes in the chromatin bodies, as well as in the nuclei and nucleoli. The inner granular layer showed similar changes, and so did the outer granular layer, but they were less marked in the latter than in the former. The rods and cones were degenerate. There were no changes (endovascular or thrombotic) in the retinal vessels. He conducted experiments by merely cutting off the vascular supply of the retina by surgical means, and compared the results obtained with those following the ischemia of quinin poisoning. The vacuolation of the retinal cells was much less marked in the former than in the latter eyes. On the other hand, the artificial and purely traumatic interference with the blood supply produced much more shrinkage of the cells and of their nuclei than the quinin toxemia did; otherwise the changes were alike in both. He considered that the differences he observed and described were sufficient to indicate that another factor beside retinal starvation entered into the case. In confirmation of this view, he pointed out that it is in accord with what we know of the clinical aspect of quinin poisoning, in its selective action on the special sense organs. Changes in the optic nerve were only observed at a later date and were, in his opinion, merely secondary; he used Marchi's method in his examination of the nerve fibres.

These experiments were criticised in their turn by Drualt (1900), who controlled them by a similar series on quinin-poisoned animals. He found that the primary changes were situated in the ganglion cells, and particularly in those at the periphery of the retina, and he believed that the degeneration in them was due to the direct action of the quinin on the cellular elements, and not primarily to the malnutrition brought about by the ischemia. His argument that the preservation of the fibres, which supply the centre of the retina, can hardly be explained on

the theory of vascular spasm, is one whose validity many will challenge; for any influence, which lowers the total blood supply to the retina, will surely be most felt at the periphery, where the pressure is normally lowest, and least felt at the centre, where it is highest. Drualt's main criticism of Birch-Hirschfeld's technic is on the ground that rabbits are unsuitable subjects for such investigations, since changes are very easily produced in sections of their retina by slight modifications of the method used. Drualt, Abelsdorff and Nuel have all failed to find the changes, which Birch-Hirschfeld described as occurring in the nuclear layers of the retina.

So much for the experimental work that has been done on the subject. We have seen that there are two schools of thought, one of which ascribes quinin blindness to starvation of the retina as a result of the ischemia produced, and the other believes that there is a selective toxic action of the drug on the cells of the retina. Some additional light is thrown on the case by an examination of the clinical records, and by a consideration of certain features of the toxic amblyopias which follow the action of other poisons.

Mention has already been made of cases in which patients have described the extinction of their sight as occurring with dramatic suddenness, and attention has been drawn to Barabaschew's extraordinarily interesting case, in which amaurosis lasted half a minute, and returned 10 times at intervals of from 5 to 10 minutes, the sight being normal between the attacks. It would appear certain that spasmodic vasomotor constriction plays an important part in these cases. Other facts which point in the same direction are: (1) Parker observed the columns of blood presenting a broken appearance in the retinal vessels of his case. (2) Stasinski met with a case of quinin amaurosis, in which vision improved when the patient lay down, and diminished when he sat up. (3) Zanotti had a girl under quinin treatment whose sight suffered each time that a dose of .75 cg. of quinin was given her; at the same time, her discs paled and her retinal arteries narrowed; and (4) the writer has recently met with the same sequence of events after a very small dose of quinin in a highly susceptible patient. It would hardly be safe in these two latter cases to argue that the loss of vision was due to the ischemia They might both be effects of some common cause.

There is, however, a very strong argument against the view that the blindness of quinin poisoning is due to retinal ischemia, and it is to be found in the fact that there are a number of cases on record, in which the retinal vessels were either normal in appearance, or at the most were only slightly contracted, at a time when absolute amaurosis, with wide dilatation of the pupil, had been definitely established. The earliest of such were two reported by von Graefe; since then, others have been recorded by Ballantyne, Browne, Buller, Webster Fox, Garofolo, Jodko, Kaz, Muntedam and Williams. Attempts have been made to discredit this evidence, but it is obviously impossible to explain away so considerable a number of observations made by such reliable and distinguished surgeons, even were they not supported by experiments on animals, as indeed they have been; for, de Schweinitz records a very similar experience in a dog blinded by a dose of quinin, given the previous day. In this animal there was no evident change in the colour of the discs, or in the calibre of the veins; the arteries were smaller than they had been, but their shrinkage was very gradual, and took 21 days to its complete accomplishment; during the whole of this period, the animal was totally blind. Nor was this experience an isolated one, for the same author remarks in a foot-note that "occasionally in dogs, altho the blindness is complete, the shrinkage of the vessels does not occur till some days afterwards." Ballantyne has further pointed out that even in ordinary typical cases, there is no close connection between the degree of ischemia and the state of the vision, and that one of the most striking phenomena of quinin pois-

oning is the recovery of vision at a time when the optic discs are becoming paler and paler, and when the attenuation of the retinal vessels is becoming more pronounced. We must not forget, however, that at a still later stage of months or even years afterwards, the gradual and permanent restoration of vision is accompanied by some measure of visible increase of the retinal circulation. It would be well to avoid laying too much stress on this latter argument; nor should we overemphasize the value of the opposing evidence furnished by Hobby's case, in which, with marked ischemia of both retinae, the vision of the right eye was 0.50, whilst that of the left was only 0.03. In a few days both recovered vision of 0.80. The inequality of the visual power, coincident with the bilateral ischemia, is striking, and would be convincing if we could only be sure that the constriction of the retinal vessels was the same in both eyes; unfortunately we cannot.

Yet another argument is furnished by W. W. Gray, and endorsed by de Schweinitz, for whom he was working. It is that "tho the original effect (of quinin on the eye) is in some sense due to the influence of this drug on the vasomotor centres, this cannot be the entire explanation, or we should have similar actions under the influence of well-known vasomotor stimulants like ergot." De Schweinitz describes the signs of ergot poisoning as follows: Wide dilatation of the pupil, blanching of the optic discs and contraction of the retinal vessels.

Whilst the signs and symptoms of quinin poisoning closely ally the action of the drug with that of the many other toxic substances which produce amblyopia, there are distinct features which stamp this toxemia as specific. These are: (1) The absolute completeness of loss of all vision, sometimes coming on quite suddenly; (2) the extraordinary recovery of function which may subsequently occur; (3) the fact that the central vision comes back first, and that the peripheral vision is recovered more slowly and seldom, if ever, completely; (4) that the color sense is often damaged, but that if it returns, it does so first at the centre, and then works gradually outwards; (5) that a diminution of the light sense, with resultant night-blindness, is a frequent, if not an invariable sequence of these cases. No such syndrome occurs in any other form of toxic amblyopia; moreover, as de Schweinitz showed, each of the poisonous drugs, which affect vision, produces more or less specific results of its own, thus suggesting that each acts on definite structural elements, and in a specific manner. Ballantyne suggested the possibility that quinin acts selectively on the rods, and he considered that the night blindness, so often complained of in these cases, supports this view. Ingenious as the suggestion is, the evidence on which it is based is somewhat sketchy. The weight of the latter would undoubtedly favor the view, that in dealing with quinin amaurosis, we have to do with a specific toxemia, a feature of which is a powerful selective action. As to the precise nature of the structure selected, we are not yet in a position to pass a final judgment. It is obvious that when a retina, or indeed any other organ, is suffering from the effects of a powerful intoxication, the cutting off of its blood supply may become a very important and even a dominating factor in the situation. In other words, the ischemia is not the primary, or the principal cause of the amaurosis, but it is none the less an influence of the gravest possible import and one which we must never omit from our calculations.

Before closing the subject, a word should be said on the parallel that has been drawn between quinin amaurosis and that occurring after hemorrhage. Surgeons have written and spoken, as though the two conditions were indistinguishable from each other, if not identical. Webster Fox has ably dealt with this matter, and has laid the myth to which we have referred. In 106 cases of blindness following hemorrhage, he found that the clinical picture of a pure ischemia without inflammatory changes was invariably absent; restitution of normal central vision did not occur; nor was the syndrome of sudden deafness and blindness ever observed as a result of a severe hemorrhage. Dealing with this subject, Fuchs gives acute anemia, after great loss of blood, as a cause of optic

neuritis, and he states that hemorrhage from the stomach and uterus are the most frequent causes of the condition; the blindness does not set in until some days after the hemorrhage and is generally incurable.

TREATMENT.

The first and most obvious indication in the treatment of quinin poisoning is to stop the supply of the drug. There is, however, a tendency amongst a certain school of practitioners to argue that blindness is preferrable to death, and that therefore the treatment of malaria will sometimes demand the sacrifice of sight in order to save life. Those who adopt such a position must see to it that their diagnosis is correct, and that the symptoms, which they ascribe to malaria, such as vomiting, headache, delirium and coma, may not in reality be manifestations of quinin poisoning. They must also satisfy their colleagues, that there is no method of effectually treating severe cases of malaria other than the exhibition of the large doses of quinin which they advocate. The writer does not attempt to dogmatise on the latter subject, but he is skeptical as to the favorable reception of such a view by those who have had large experience in the treatment of tropical diseases.

Once a patient is known to have an idiosyncrasy for quinin, or to have suffered from poisoning by this drug on some previous occasion, it is advisable to avoid the exhibition of any of the cinchona products, if possible. It has already been pointed out that in the experience of de Schweinitz, Knapp, Nettleship and others, patients, who have already suffered from poisoning by large doses of the drug, are liable to be adversely affected on subsequent occasions by comparatively small ones. Manolescu, not merely lays great stress upon this point, but urges that the greatest care should be taken in the use, under such circumstances, of any product, which is known to be liable to bring about any form of toxic amblyopia. The lesson he teaches is strongly reinforced by Schwabe's experience, which we have already quoted at length.

We pass now from negative to positive measures, and shall deal first with the drugs which have been recommended by different writers. By far the most popular of all these is strychnin (Baldwin, de Schweinitz, Jodko, Kirkpatrick, Parker, Reina, Weeks and others). De Schweinitz ascribes its value to direct stimulation of the optic nerve fibres, but it seems possible that this may not be the whole cause of its favourable influence. It is said to prove more satisfactory when injected subcutaneously.

We come next to the drugs which favour vasodilatation, and of these, nitrit of amyl has been the most favoured (Baldwin, Kirkpatrick, Parker, Reina, Weeks and others), whilst nitroglycerin has had only one advocate (Parker). This is the more incomprehensible since the action of the former drug is well-known to be very transient, whilst that of the latter is slower and more lasting. One would have thought that these characteristics would have recommended nitroglycerin. It may be mentioned that Parker combined the two, giving 2 minims of nitrit of amyl thrice daily, together with 1-75th grain of nitroglycerin every 4 hours. Digitalis has appealed to a number of the writers (Buller, de Gouvea, Gruening, Tiffany, Weeks) presumably because it increases the force of the heart beats. The bromides and iodides have both been called into requisition, but do not appear to have attained to any great popularity. Webster Fox, however, claims to have obtained great improvement under treatment of a severe case with hydrobromic acid. He gave 15 minims thrice daily to a boy of 13, who had been given large doses of sulphat of quinin for a long period. In a case with high tension Tiffany used eserin, not unmindful of the advantage obtained by its action on a dilated pupil.

So much for drugs. We may now pass on to other measures. Reina used massage, presumably because the appearances present sometimes resemble those of embolism. It is doubtful whether such a proceeding is of the least value, the more so as it appears to be founded on a mistaken view of the pathology of the complaint. Galvanism has been recommended by Weeks and Buller. Its value, too, is

questionable. Kirkpatrick employed Bier's suction-glass. Weeks and Baldwin have suggested keeping the patient recumbent. This recommendation is supported by Stasinski's case already mentioned, in which the vision of a quinin-poisoned patient improved each time he lay down, and diminished when he sat up.

Lastly we come to the general management of the patient. Von Graefe's recommendation in favour of bleeding has deservedly met with universal condemnation. Weeks sums up the indications as follows: The relief and prevention of vascular constriction by the use of drugs, etc.; the adoption of vigorous supporting measures inclusive of a generous diet and plenty of fresh air; the insistence on the recumbent position with the head low for the first ten days, in order to favour a freer flow of blood through the retinal and choroidal vessels. It remains only to mention Manolescu's jeremiad, in which he claims to have tried every possible measure in turn and to have found all equally useless.

Operative treatment. The writer desires to put forward a tentative suggestion for the consideration of ophthalmic surgeons. There can be no question that the constriction of the retinal vessels plays an important part in the pathology of quinin amaurosis. A recognition of this fact has led ophthalmic surgeons to employ such drugs as nitrit of amyl and nitroglycerin. If the intraocular pressure could be permanently reduced by operative measures from normal to subnormal limits, it seems reasonable to suppose that the flow of blood through the eye would be increased; under these circumstances, an improvement in retinal function might be anticipated. It was on such lines as these that Mayou recommended sclero-corneal trephining in the treatment of retinitis pigmentosa. The same operation seems worthy of trial in some of the permanent cases of quinin amaurosis, in which the visual defects are associated with the ophthalmoscopic signs of severe constriction of the retinal vessels. The way in which contracted visual fields have been found to improve, even after the lapse of years, would seem to indicate that something might be done in very late cases.

POISONING BY ETHYLHYDROCUPREIN.

Ethylhydrocuprein Hydrochlorid (syn. Optochin) is spoken of by Morgenroth, as if it were a quinin preparation. Martindale and Westcott give its formula, as $C_{21}H_{28}N_2O_2HCl$. It would seem to be a very dangerous drug, when administered internally. On account of its destructive power on pneumococci, it has been recommended in the treatment of pneumonia, though in this field it has belied its promise, since it has failed to check the disease. On open surfaces, where it can get at the organisms, it has proved of much more value. The indictment against its internal administration is not merely that it is useless, inasmuch as the drug fails for some reason to reach or to destroy the pneumococci, but that it is extraordinarily liable to produce a type of amaurosis, closely resembling that following the ingestion of poisonous doses of the salts of quinin. This toxic action follows the use of relatively small doses of optochin, and occurs in a much larger percentage of the patients than is the case with quinin. Cases of optochin blindness have been recorded by Adler, Oliver, Fränkel, Weeks, Scheel, Uhthoff and Feilchenfeld.

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ACUTE IRITIS DEVELOPED AFTER AMEBIC DYSENTERY.

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Report of a case in which acute iritis appeared after acute amebic dysentery, resisted other treatment, and rapidly improved under injections of emetin hydrochlorid. Translated from the Spanish by H. Aufmwasser, M. D.

The manner in which dysentery of the tropics, caused by the *Entameba histolica.* affects the large intestine, liver, lungs, pleura, the nervous system, and the joints has been well studied. The disturbances it creates are sometimes due to the presence of the amebas, or in other cases seem to be caused by the secretions of the parasite, which when absorbed and carried by the blood, affect the organs. But we have not found anything written which treats of disturbances of vision in amebic disease; and it does not seem possible that tissues so richly vascularized and sensitive as are those of the uveal tracts, should escape all pathogenic action of those protozoa

manifested by an acute iritis, such as is the object of this communication.

In no way should it be thought that in such cases the amebae themselves may be present, producing the changes in the eye; because it is not a necrotic process of the iris. There seems to be rather an irritation provoked by the secretions of the parasites proceeding from a distant point.

Our case has an obscure etiology, if we do not consider the amebic dysentery which has preceded; and the fact that the eye lesions did not react to the ordinary or regular treatment, but persisted without undergoing any change until one injected emetin hydrochlorid. The improvement coincided also with the disappearance of the amebae in the fecal matter. This seems to us to be important enough to be taken into consideration. Naturally from one isolated case, it is not possible to form a conclusion. Our object is to state the fact that amebic infection should be taken into consideration as a cause in future cases.

The etiology of amebic iritis should not only interest the oculists in the tropics; because the world war is showing plainly that the dysentery of warm climates is perfectly developed and transmitted in Europe, where it also takes an epidemic form.

Our patient is a young lady of this city, age 18 years, well developed, without any pathologic past. She has never suffered from the eyes. Her parents are living and well.

On February 12th she had to consult a physician for dysenteric symptoms of medium intensity, the duration of which was one week; and which easily yielded to diet and intestinal lavage with creolin. During the convalescence, on the fourth day, she began suffering disturbances in her eyes which resisted all remedies. Three weeks after this condition, we were consulted.

On the 18th of March she presented the following condition: Diminution of vision, frontal headaches, photophobia, lacrimation, conjunctival and ciliary injection. Pupils medium, contracted, and sluggish. Iris: color of dead (dry) leaf, placed on the anterior crystalline lens; its free border adherent to the anterior portion of the lens. Media, transparent. Fundus, normal; teeth, healthy. Mammary glands normal; tonsils, small and atrophied. Lungs, healthy; liver, normal. Genital organs, sound. No furnuculosis or abscess in any part of the body. Blood test: eosinophlia and polynucleosis.

It was evidently a case of acute iritis, bilateral, of medium intensity, complicated by posterior synechiae. As to the etiology of such an iritis, the ordinary antecedents were lacking and the investigation did not make it any clearer; only dysentery preceded the ocular symptoms.

We applied the treatment advised in such cases: Treatments—general and local, hot fomentations on the eyes, instillations of dionin-atropin, and visual rest in a dark room. With this treatment the synechiae were broken and we obtained complete dilation, but nothing else. The clinical picture persisted three weeks, without any improvement being noted, nor any aggravation. Bearing in mind the results of the blood test and dysentery, which we have mentioned, we sent the fecal matter to be analyzed. The result was: An abundance of *Entamaeba histolitica*. Although the literature does not record iritis from this etiology, we think that the large quantities of amebae in the intestines could be the cause of the iritis. We explained the process, not by the development of the amebae in the tissue of the iris, but by the action of their secretions on the same, which introduced into the intestines, and absorbed were carried by the blood into the eye.

Being convinced of such possibility, we did not change the local treatment; and began injecting 0.08 centigrams of emetin hydrochlorid, increasing by 0.02 centigrams daily up to 0.12 centigrams without inconvenience.

Result: Improvement from the first injection, disappearance of the manifestations in the left eye on the third day. Test of the fecal matter on the same date: Small quantities of amebae. Two more injections were suffi-

cient to cause the disappearance of the disturbances in the right eye. The local medication was suspended. A new examination of the fecal matter proved negative. The following days the injections were continued until the introduction into the organism of 0.90 centigrams of emetin hydrochlorid. The microscopic tests were repeated and proved negative. We have frequently seen the patient and she has not manifested any further disturbances of her vision.

[In this connection see the cases of iritis and cyclitis occurring in connection with bacillary dysentery, p. 451.]

PROBABLE ROLE OF TEETH AND TONSILS IN THE ETIOLOGY OF INFLAMMATORY EYE DISEASES.

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BIRMINGHAM, ALABAMA.

Mention of the earlier literature of the subject with reports of cases arranged according to the eye lesions exhibited, and bibliography. Thesis submitted for the degree of Doctor of Ophthalmology, University of Colorado Graduate School.

Medical literature of recent years embraces much on the etiologic relationship of accessory sinus inflammations to eye diseases. Since 1913, a large number of articles have dealt with relationship of intestinal and dental disorders.

The epoch making work of Rosenow[7] on the transmutation and selective localization of pyogenic organisms in the various tissues of the body has revolutionized some of our ideas of etiology and pathology.

The experimental and clinical investigations of Irons[20-21] and Brown have been especially valuable in classifying our otherwise hazy ideas of the infections producing iritis. Until recently iritis and iridocyclitis were regarded as practically always due to syphilis, gonorrhea and tuberculosis.

In the R. L. Oph. H. Reports for November, '14, Goulden[14] details a careful study of 6,835 cases of eye diseases, and proves to his own satisfaction that many cases of iritis and choroiditis were secondary to and caused by pyogenic infections of the mucous membranes. His article is most exhaustive and illuminating.

Wm. Lang, of London, has likewise tabulated the etiology of 383 cases of inflammatory eye diseases and demonstrates that in 215 of these some of the pyogenic infections existing in other regions of the body were the underlying causes. He names appendicitis, kidney, skin, nasal, colonic, pyorrhea, throat, and other chronic infections, and says that every tissue of the eye is subject to infection, secondary to either and all of these.

In the transactions of the International Medical Congress for 1913, de Schweinitz[20] reviewed the literature, and argued that any infection of the oral or intestinal mucous membranes may possibly produce secondary lesions in various tissues of the eye.

Wescott,[34] Krebs, Haskins,[17] Burt,[7] Campbell,[8] Hardy,[15] Ibershoff,[18] MacKenzie,[24] and others have presented interesting articles in this connection.

In the spring of 1912 the following case came under my observation and the unsatisfactory efforts to discover its etiology suggested the line of study elaborated in this paper.

Case A.—I. B., white female, age 11, referred for the relief of recurring inflammation of the left eye. Father, mother, four brothers, and three sisters living and well. Patient had measles at age of six and since that time has had frequent attacks of sore throat. Other than this, the history is

negative. The right eye is apparently normal. The left eye counts fingers at one meter and vision is unimproved by lenses. The conjunctiva of the left eye very red—bluish red, more pronounced near limbus. Several leucomata about periphery of the cornea, especially the lower border. Anterior chamber is clear and rather deep. Iris has greenish brown, muddy appearance, and the pupil is fixed.

At this time the eye was not painful but the parents say there had been much pain during each of some five or six attacks, occurring at intervals of six to eight weeks during the past two years. There was no specific history in the father and no miscarriages by the mother. Wassermann was negative. The general appearance of the eye was very suggestive of luetic iritis. The child was given a hypodermic of mercury as a provocative, after which a second Wassermann was made, but it was likewise negative. The child was referred to an internist for thorough examination and he reported no evidence of any systemic disease. A radiograph of the chest showed no enlarged bronchial glands. A von Pirquet was negative.

This child was under observation for two months, during which time the usual remedies were employed without relief. Notwithstanding the negative Wassermann, she had active specific treatment, but of no avail. The tension finally became minus, the eye blind, and it was enucleated. The eyeball was sent to Dr. Graham, who reported that he "could find no evidence of tuberculosis or syphilis"; but thought it a "case of chronic inflammation, possibly due to some pyogenic organism." Two months later the child had acute tonsillitis and visited my office for treatment, receiving the silver applications, rest in bed, hot saline gargles, etc. Barring of acute nephritis, she seemed well in a fortnight. About a month after recovery from the tonsilitis she consulted me for pain and redness in the right eye, which had the appearance of irritation from some foreign body, but none was found. The next day she returned with definite signs of iritis; and on this visit had temperature of 101 with an acute arthritis of the left wrist. She went to the hospital and her tonsils were enucleated that day. The pupil of the eye was dilated easily with one drop of 1 per cent solution of atropin, q. i. d., for two days. All signs of irritation in the eye and all signs of arthritis cleared up within a week. A month or two later I heard Dr. Haskins of New York present a paper to the American Otological Rhinological and Laryngological Society on "latent dental abscess" and it was the impression made by the case above mentioned and by the paper presented by Dr. Haskins that started me on this line of study in the summer of 1912.

Before attempting to establish any relationship between the special eye diseases, and some probable focus of infection about the mouth, a careful examination with assistance of radiograpic study of the lungs, urinalysis and Wassermann test (after provocative doses of mercury) were employed. The assistance of an internist was enjoyed with each case. Every effort was made to exclude tuberculosis, gonorrhea, and syphilis as possible factors.

IRITIS.

Case I.—Mrs. W., white, age 27, consulted me in July, 1912, for pain and redness in left eye of two weeks' duration. On examination the right eye was normal, with vision of 6/5. The left eye showed general injection, redness, more marked about edges of the cornea. Pupil reacted sluggishly. Outlines of the iris were cloudy. Patient gave history of frequent attacks of tonsillitis, the last occurring one week before the onset of the present eye irritation. The dentist reported the gums in good condition, and in no teeth had the nerves been killed. There were no signs of irritation in the throat, the tonsils were small, the crypts distended with yellow, cheesy debris. There was a history of muscular pain at various times within the preceding year, and a rather suggestive history of arthritis in the left elbow four months before. Immediate tonsillectomy was urged,

and performed on the second day. The pupil of the inflamed eye was very slightly contracted and the reaction was sluggish, but there was no evidence of synechiae. In the treatment of this case, the pupil was not dilated, the patient was kept in bed one week, given no medicine, and at the end of this time the general appearance of the eye was hardly different from that of its fellow.

Case II.—Mrs. K., white, aged 39, consulted me in November, 1912, complaining of recurring attacks in first one eye and then the other during the preceding year. At the time of examination there was a dark bluish circle around each cornea, sluggish reaction of each pupil and slightly greenish reflex from each iris. Patient had been in bed more than half the time for the preceding two months with inflammations of wrists, ankles and two finger joints. She had four healthy children and had suffered no miscarriages. There was marked disease of each tonsil with cryptal retention and the consulting dentist advised immediate removal of two teeth showing dental abscesses. The pupils were dilated at once, the teeth removed that day and her tonsils enucleated ten days later. The mydriatic was omitted the day of the tonsillectomy. The eyes returned to apparently normal condition in three weeks, and there was a slow but steady improvement in the "rheumatism." This patient gained 30 pounds in a year and was seen in 1916, four years later; and there had been no recurrence of eye irritation and no further suggestion of "rheumatism."

Case III.—Mrs. B., white, age 33. First seen in May, 1913, for "iritis of left eye." She had made her own diagnosis, stated it was the "third attack" and she "recognized the symptoms." She claimed to have had two previous attacks of "rheumatism," always in the left ankle and always asociated with or followed by an attack of "iritis in the right eye." The left ankle was swollen, tender and red. Patient had temperature of 100 3/5. She presented the usual symptoms of iritis of a very mild degree in the right eye. It struck me as rather peculiar that the arthritis should be always in the left ankle and iritis in the eye of the opposite side. On close investigation I found that the left ankle had been severely sprained four years before, requiring the use of splints for six weeks. At a subsequent period, I refracted this patient under atropin and found that she needed a plus 1.00 D. cylinder for the right eye at 90 and for the left eye a +.25 D. sphere. It would seem that the disease had located itself in this case in a left ankle, made weak by a former injury; and in the right eye, because of eye strain. This woman was the mother of three healthy children with no history of miscarriages. The tonsils presented no signs of acute irritation, they were small, the crypts showed definite retention. The tonsils were removed the next day and in the left was found an abscess containing fifteen or twenty drops of pus. The inflammation of the eye disappeared in a few days and it seemed normal at the end of two weeks. This patient has been seen once or twice each year for the last three years and has suffered no return of arthritis or iritis.

Case IV.—Male, white, age 27, clerk. First seen in May, 1915. Has always enjoyed perfect health and had no leutic history. Returning six weeks ago from a fishing trip was delayed in rain and "caught cold," and to this he attributes an attack of pain in the left elbow joint and associated with it, severe pain, redness and irritation in each eye. This man's left eye showed the classical signs of serous iritis. A careful examination of the tonsils showed no disease. His gums were apparently perfect and normal, and one was at a loss to explain the possible cause of his infection. A careful radiograph showed apical abscess of the anterior bicuspid tooth of left upper jaw, and after its removal the pain of the elbow and signs of inflammation in each eye rapidly disappeared.

UVEITIS.

Case I.—A. G., white female, age 9. Was first seen July, 1914, referred by family physician for "granular lids."

Father denies any specific infection; mother's history without interest except she has had three miscarriages and has four healthy children. Child is small but healthy and robust; has been confined to bed for periods of four to eight weeks at five different times with "inflammatory rheumatism," the most recent attack lasting six weeks, occurring four months ago. Has had no "rheumatism" in the joints since that time, but has suffered two attacks of tonsillitis each of one week's duration. The mother said child had "growing pains" frequently, but only after "taking cold." The eyes were red and showed much irritation. There was marked photophobia of the right eye. Pupil of right eye was two or three times normal size, pupil of left eye was greatly contracted and both were immobile. The posterior surface of each cornea, in its lower half shows numerous mutton fat droplets. The vision of the right eye was 6/18, left eye 6/24, much cloudiness of the vitreous in the right eye. The Wassermann, *after a provocative was negative.* Child had four teeth in upper jaw and three in lower with badly diseased crowns, gums red and irritated. The tonsils were large, bleeding on pressure—the typical "succulent" kind. The diseased teeth were removed and the mouth cleansed every hour for two or three days, after which the tonsils were enucleated. For five days preceding the tonsillectomy I was instilling into each eye four times daily, a one per cent solution of atropin, but had been unable to dilate either pupil. The atropin was discontinued the day of the operation, but five days after the tonsillectomy the child complained of severe and sudden pain in the left eye and it so happened that I was in the hospital at the time. I examined her carefully, after having seen her one hour before. During this hour there had been marked dilation of the pupil excepting for two synechiae in the lower outer quadrant. There was no apparent increase of tension in the eye to the finger test. Atropin was begun in each eye one week after operation and in a few days each pupil had reached its maximum.

Another interesting phase of this case was that four days after the operation, and the day preceding occurrence of the above attack of eye and brow pain, the child was taken with precordial angina, so severe that it was unrelieved by ice bags and paregoric; indeed it was unrelieved until she had received three hypodermics of morphin. Her condition was carefully studied by an internist, who failed to find any heart lesion and there was no rise of temperature. This peculiar attack remains unexplained. A second Wassermann was made after the child left the hospital and it likewise was negative. However, in spite of second negative Wasserman, remembering the history of miscarriages, I had strong suspicion that there might be lues in this case and gave antispecific treatment for two years. Within four months after the operation the child's eyes were normal and there has been no recurrence of eye symptoms or arthritis.

Case II.—*Recurring uveitis of four years duration.* Mrs. H., white, female, age 30, 1914, father living, mother dead of some acute illness. Brothers and sisters living and well. Extremely nervous, but gives no history of any definite disease. Is mother of one healthy child. According to her physician the patient is now suffering with a typical attack of sciatica, also has pain and tenderness in right wrist, so severe as to prevent its use. She was thoroughly examined by an internist, who reported phlebitis of left femoral vein. The Wassermann was negative. White blood count 16,500, polymorphonuclears 65, small lymphocytes 30. Tonsils were large and crypts distended with foul debris. The tonsillar condition was regarded as a probable cause of all symptoms, but radiographs of the teeth were secured. This showed latent abscesses. At this time the vision of the right eye was 15/20, left eye could only count fingers at one meter. The sclera was a deep violaceous tint, with intense injection around cornea, and mutton fat droplets on posterior corneal surface, pupil slightly dilated with fixed outlines. The fundus of the eye not seen—only a slightly pink reflex recog-

nizable. Patient gave a history of having four previous attacks within period of four years, in the last preceding attack she was seen by the writer. The tonsils and teeth were removed, there was quick relief from the pain in wrist and sciatica. There was steady improvement of the phlebitis. The eye had no treatment whatever except the persistent use of a mydriatic. The signs of infection disappeared within eight weeks, and at the end of four months the vision was 15/20 with .50 S. and 1.00 c. ax. 105°; and aside from the few floating filmy shreds in the vitreous the media are now normal. There has been no return of the eye discomfort after a lapse of nearly three years.

EPISCLERITIS.

Case I.—Miss J. D., white, age 20, recurring attacks of redness, soreness and pain first in one eye and then in the other at intervals for the past two years. Consulted me during the fifth attack. There was a slight papule of pearly hue surrounded by deep redness in the left eye some six millimeters external to the limbus. There was profuse lacrimation, throbbing and burning of eyes, with a temperature of 100½. This patient gave a good family history; and there was nothing in the personal history except great menstrual discomfort monthly, persisting for two or three days. She was referred to her family physician for examination who reported that he could find nothing abnormal. The tonsils appeared free of disease. A radiograph of the sinuses showed no abnormality. There was a great deal of pyorrhea around the roots of several teeth, and apical abscesses or granulomata at the roots of three. The pupils were dilated, but the patient received no other treatment. The teeth were removed. The pockets well curetted and the pyorrhea treated. The day after the removal of the teeth, the patient had an acute arthritis of the left wrist joint; with temperature of 103°. Four days later, this rapidly subsided and within a week it entirely disappeared.

Case II.—Miss A., white, female, age 21, father died at age of 65, of pneumonia. Mother living and has diabetes; two brothers and three sisters living and healthy. Has had good health. Tonsils removed two years ago because of cervical lymph nodes and "rheumatism." Neither condition has been entirely relieved by tonsillectomy. Since April, 1912, she has had several attacks of inflammation in the left eye. First seen in May, 1914, with pain, redness, browache, grayish nodule, three millimeters external to limbus of right eye. Urinalysis negative, Wassermann negative. Patient had taken 20 or 30 grains of aspirin daily for a period of five to ten days, for attacks similar to this on several occasions, and said she always had to have her "pupils dilated for a period of three or four weeks." She was referred to an internist who said he could find no physical condition to account for this discomfort. Patient was refracted—right eye, —0.75 D. c. ax. 75°, left eye 0.62 D. c. ax. 105.° Patient wore this glass for several weeks and had a mild return of the inflammation in the eye in October, 1914. It was then that I first advised a radiograph of her teeth. This showed latent dental abscess or a granuloma at the end of one bicuspid. The latter was removed and the cavity curetted, and this time the patient was given no anodyne and no mydriatic was employed. There was a definite improvement on the third day, with complete relief from all discomfort and entire disappearance of all redness on the ninth; and there has been no return of the discomfort after a lapse of two and a half years.

Case III.—Miss S., white, female, age 20, a stenographer, complains of recurring redness, burning pain and nodular swelling over the white of the left eye, near insertion of the externus muscle. Father dead, supposed to be from tuberculosis. Mother living and healthy. Lost two brothers in early childhood; only sister is living and well. Has had the usual diseases of childhood, but other than this had been perfectly well. Wears glasses, + 0.75 D. with + 0.25 D. c. ax. 90 for each eye. Suffers no headaches, has no eye

discomforts except during these attacks of redness, swelling and pain. The first attack in which I saw her was the fifth from which she suffered. She was treated with antirheumatics, mydriatics and rest, with recovery in four weeks. This was in 1911. I saw her in two similar attacks in 1912, and treated them successfully along the lines mentioned above. In 1913, I saw her in another attack, and it then occurred to me that the teeth might have some connection. They appeared to be in good condition, except one or two small cavities that were not thought to have any influence. The teeth were carefully radiographed with a negative result. I then found that the crypts of each tonsil were filled with offensive detritus and knowing that we were claiming to cure many cases of subacute "rheumatism" by removal of such tonsils, advised tonsillectomy. The patient rather reluctantly consented and the eye symptoms cleared up before the throat healed entirely. During this attack the patient's pupils *were not dilated.* After four years there has been no recurrence.

CORNEAL ULCER.

Case I.—G. E., white male, age 56. first seen in 1913 regarding superficial ulcer over center of right cornea, slight pain, much irritation and lacrimation, scleral injection and photophobia. Negative Wassermann. Patient uses neither tobacco nor alcohol. Usual treatment for ulcer. The eye was improved but never remained well longer than a few weeks. Was under observation two years and seen by several oculists. Patient was thought to have had tuberculosis twenty years before, and he was frequently examined and had radiographs of the chest, but the consultants reported all findings as negative. The tonsils were bad. Many of the crypts containing detritus, abundant and offensive. There was much pyorrhea, several pus pockets and latent apical abscesses or granulomata at roots of four teeth. He declined tonsillectomy but the crypts were cleaned out at intervals of two or three days with air blast and diluted alcohol, with marked improvement of the condition in his throat. The diseased teeth were removed, the gums properly treated. After a few weeks his eye greatly improved, the ulcer healed entirely and after eighteen months there was no return of the ulceration, altho there was a slight leucoma. About this time he left his home for several weeks travel. His tonsils were not cleaned out periodically as had become his habit. He developed an attack of acute cryptal tonsillitis followed by a recrudescence of his eye ulcer. It was no longer difficult to persuade him to have the tonsillectomy. This was performed, and after nearly one year he has remained free from all suggestion of eye discomfort.

RETROBULBAR NEURITIS.

Case I.—March, 1916. C. B., white male, age 67, has enjoyed good health all his life. Retired from business a few years ago, and since then has spent much of his time recreating and fishing. Said his general health was excellent. He was an inveterate smoker, had never used alcohol. Had recently noticed what he described as a "shadow" growing over field of vision, which seriously interfered with his comfort. "It seems like a filmy curtain dropping down from above." Had glasses changed several times in the last year, and still felt that they were far from satisfactory. Had no pain whatever about the eye except that when washing his face he complained that the "pressure of my fingers on the eyeballs caused discomfort." The pupils reacted to light but were rather sluggish. The eyes appeared normal, the movements in every direction were satisfactory. There was nothing discoverable on ophthalmoscopic examination. He was referred to an internist, who reported him free of any definite disease, but the blood pressure was 180 systolic 110 diastolic. The Wassermann was negative. Ten days later the patient was given a provocative dose of mercury and the second Wassermann likewise showed negative. This man was taken off his tobacco, given small doses of mercury, put to bed and had

sweat baths twice daily for two weeks. The patient felt that there was a definite "thinning out of the shadow" of which he complained, and there was an improvement in his visual acuity. A month later his condition began to grow worse tho he had not smoked at all during the six weeks. I had already advised him it might become necessary to have his teeth examined. The dentist reported extensive pyorrhea and abscesses or granulomata at the roots of seven or eight teeth. These teeth were extracted and his gums were treated. There was apparent cessation of progress of his troubles, but after two years there has been little improvement in his vision.

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CONVERGENT STRABISMUS TREATED BY ATROPIN AND GLASSES; WITH SOME CASES OF HEREDITARY STRABISMUS.

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A tabular report of twenty-nine cases of convergent strabismus showing the results obtained by non-operative treatment, with a series of cases of hereditary strabismus. Read before the Chicago Ophthalmological Society, April 5th, 1918.

In 1914 Valk read before the American Academy of Ophthalmology and Oto-Laryngology a paper entitled "Strabismus," during the course of which he advocated, at least by implication, its invariable treatment by operative means. It is not always fair to an author to quote isolated paragraphs, but the following seem to me to contain the gist of his paper, and to present his position correctly:

(1) "Finally, I would like to ask the question, even though we are urged not to operate until all other methods fail, when should we operate on these cases? Or, to put the question in another way, should we not operate on all cases of squint? That last question is a very broad one, and I fear many will say it is all wrong; but it is a question often in my mind, altho I have not yet the courage to urge its advancement."

(2) "If an operation must be performed, if that is the final procedure, then the reason for that operation must be the true cause of all cases of strabismus."

(3) "Where shall we draw the line between latent and fixed squint * * * all the anatomic conditions are the same in both conditions of squint."

(4) "The true cause of squint must reside in the muscular balance of the eyes, and it seems also suggests to the inquiring mind that weak muscular action associated with any of these contributing causes may produce convergence that may be corrected by glasses; and that excessive muscular action must demand operative interference, and all other means will be useless. Hence a diagnosis of muscular balance suggests the proper procedure for correcting the contributing cause, or, if necessary, a suitable operation."

The author's style is somewhat involved and at times difficult to follow, but the above quotations indicate that he believes all cases of strabismus, fixed or latent, require an operation, although in the last quotation he seems

to admit the possibility of other remedial measures being sufficient. The operation he advocates is that of "shortening the muscle in its long diameter." I shall not enter into the question of which operation is the most desirable, when one has been deemed necessary, but it seems to me that so drastic a position as to advocate, even by inference, an operation in every case is one which demands a careful scrutiny in the light of experience with other methods.

I think that no one will disagree with the statement that where two procedures will accomplish the same end equally well, the simpler is to be preferred. In the second place, no operation, even so comparatively a simple one as that for the correction of strabismus is invariably successful. Third, an operation for convergent strabismus sometimes results ultimately in a condition of divergent strabismus, which is certainly no improvement over the primary condition. Finaliy, we are dealing with human beings, whose wishes must be taken into consideration. It is frequently difficult, not to say impossible, to persuade the patient or his parent to permit the operation; and it becomes a question then of insisting on it with the possibility of losing the patient, or of attempting to obtain results thru some other method. If these are unreliable and their results inadequate, we are stultifying ourselves by using them, and the sooner they are discarded the better, but if the opposite is true, no amount of theory will be able to overcome their practical value, and we are justified in using palliative treatment in suitable cases and when operation, tho indicated, is refused.

Shortly after Valk's article appeared, I determined to investigate the results of the strabismus cases which I had treated by my usual method of daily use of 1 per cent atropin for about a month, followed by complete or almost complete correction of the refractive error. Cards were sent out to 100 clinical patients requesting them to report for re-examination, but of this number only 29 answered. Many of the cards were returned on account of change of residence, and the rest of the patients, or rather their parents, evidently did not consider the matter of sufficient importance to reply. The results are tabulated below. (See p. 670.)

Of these 29 cases, one never wore the glasses prescribed and one wore them only 3 months. This leaves only 27 cases of actual statistical value. One of these had not worn glasses for one year, but I include it among the failures, because the glasses were worn at least nine months, and presumably would have been worn longer had they been of benefit. Of the 27 cases, 11 were straight, 6 almost straight, 1 good, 5 improved and 4 not improved, that is, 40 per cent cures, 45 per cent improvements, and 15 per cent complete failures. However, some of the improvements were so pronounced that they could almost be called cures, only a trace of convergence persisting.

The length of time since the glasses were prescribed varied from 2 months to 6 years, and the ages of the patients ranged from 3 to 12 years. No reliance can be placed on the duration of the condition, as the answers to this question were as a rule not definite, varying from infancy to a few months. The presence or absence of heredity did not seem to play a determining role in the outcome of the cases, as some with definite taint obtained perfect results, while some where it was absent were not much improved. Likewise, the results were apparently as good when the refractive error was a compound hyperopic astigmatism with anisometropia, as when it was a simple hyperopia.

Case 20, with a simple hyperopia and a hereditary taint, did not improve, whereas in case 16, with a very probable family taint and a compound hyperopic astigmatism, oblique axis in one eye, and a simple hyperopia in the other, the strabismus disappeared after only 2 months.

Case 4 was unusually interesting. H. R., a girl 10 years old, with a most pronounced strabismus. Refraction R. E. + 0.5 S.; L. E. —4.0 cyl., ax. 180. In

the macula of the left eye there was a coloboma of both retina and choroid, and in the right eye there was a similar coloboma, but not exactly in the macula. Vision in each eye was only perception of large objects. As the strabismus had been present from infancy, the colobomata were probably congenital. Four brothers and 4 sisters had normal eyes, as did the mother. The father had chronic simple glaucoma. Nothing else could be learned about the family history. Full correction was given. The patient returned after 4 years with eyes almost straight. She was employed in a factory to paste labels on cans, and stated she had absolutely no difficulty in performing her tasks.

Case 17 came to me at the tender age of 3 years, with a most pronounced convergent strabismus. Refraction each eye + 4.0 S. Glasses (+ 2.5 S. O. U.) were prescribed and in a couple of months, the eyes became completely straight. I saw her subsequently several times for recurring attacks of phlyctenulosis, the treatment of which necessitated abandoning glasses temporarily. Each time the strabismus reappeared, and each time promptly disappeared as soon as the glasses could be worn. Now, after 6 years, the eyes are absolutely straight so long as the glasses are worn.

Surely no better result could have been obtained by any operation, and the necessity for glasses would have been present just as much after as without an operation. And furthermore, there is always the possibility of the operation converting the convergent strabismus into the divergent form. I must absolutely disagree with Dr. Valk that an operation should be done in every case.

I have never operated on a patient younger than 13 years, and even in the case of patients over that age, have always first tried to correct the condition with glasses. There is usually no necessity for haste. A delay of six months or a year will not affect the outcome of the operation if eventually necessary, and I have yet to meet the patient who insisted on an immediate operation. Usually it is the other way around. It is necessary, as a rule, to use considerable argument to convince the patient that glasses or treatment will not effect a cure.

HEREDITARY STRABISMUS.

In conclusion, I would like to report the following 33 cases of hereditary convergent strabismus, some of which are included in the foregoing table. The remainder did not report for subsequent examination, so I have no means of determining the ultimate results.

I. O. B., male, 11 years. Father, paternal and maternal grandfather strabismus. Four brothers and four sisters normal. This is a case of direct heredity, but in spite of the double taint, only one of nine children were affected in the third generation. (3 families; 11 children, 2 affected, 9 not.) Case 2 in table.

II. D. F., female, 4 years. Parents and 1 brother normal. Paternal aunt strabismus. This is a case of indirect heredity. (1 family; 2 children, 1 affected, 1 not.) Case 8 in table.

III. D. K., male, 6 years. Parents and 1 brother normal. 1 sister strabismus. This is a case of collateral heredity. (1 family; 3 children, 2 affected, 1 not.) Case 9 in table.

IV. L. N., female, 6 years. Mother, maternal grandmother, two maternal aunts and one maternal uncle strabismus. Two brothers normal. This is a case of direct heredity. (2 families; 7 children, 5 affected, 2 not.) Case 13 in table.

V. J. H., male, 9 years. Paternal uncle strabismus. Two brothers, one sister, father and mother normal. This is a case of indirect heredity. (1 family; 4 children, 1 affected, 3 not.)

VI. E. B., female, 10 years. Two sisters, mother and maternal aunt strabismus. Five maternal aunts normal. This is a case of collateral heredity (1 family; 7 children, 2 affected, 5 not); also a case of direct heredity (1 family; 3 children, all affected).

No.	Name	Age.	Duration	Ob. Refraction. R. E.	Ob. Refraction. L. E.	Prescription. R. E.	Prescription. L. E.	Remarks
1	B. E.	7	1 year	+1.5 S ⊂ +1.5 Cyl. ax. 90°	−0.5 S ⊂ +2.5 Cyl. ax. 90°	ibid	ibid	Condition after 2 mos. about same. Mother says eyes at times entirely straight.
2	O. B.	11		−11.0 S ⊂ −1.0 Cyl. ax. 60°	−12.0 S ⊂ −2.0 Cyl. ax. 90°	−9.0 S ⊂ −0.5 Cyl. ax. 60°	−10.0 S ⊂ −1.0 Cyl. ax. 90°	Condition improved after 10 mos. Family taint.
3	M. F.	9	Latent	+7.5 S ⊂ +4.5 Cyl. ax. 60°	+7.5 S ⊂ +4.5 Cyl. ax. 115°	+4.0 S ⊂ +2.5 Cyl. ax. 60°	+4.0 S ⊂ +2.5 Cyl. ax. 115°	Eyes straight after 10 months.
4	H. R.	10	Infancy	+0.5 S	−4.0 Cyl. ax. 180°	ibid	ibid	Eyes almost straight after 4 yrs. Congenital coloboma macular region both eyes.
5	T. McL.	9	Childhood	+2.0 S	+1.5 S	+1.5 S	+1.0 S	Eyes almost straight after 4 yrs. Patient did not wear glasses for 2 yrs. and strabismus returned. Glasses again prescribed and eyes became almost straight.
6	A. K.	12	3-4 years	+2.0 S	+1.5 S	+1.5 S	+1.0 S	Eyes straight after 8 months.
7	H. G.	7	Several years	+4.5 S	+4.5 S ⊂ +0.5 Cyl. ax. 90°	+4.0 S	+4.0 S ⊂ +0.5 Cyl. ax. 90°	Improved after 6 months.
8	D. F.	4	Few mos.	+1.5 S ⊂ +0.5 Cyl. ax. 90°	+3.0 S	+1.0 S ⊂ +0.5 Cyl. ax. 90°	+2.5 S	Eyes straight after 4½ years.
9	D. K.	6		+3.0 S ⊂ +1.0 Cyl. ax. 90°	+4.0 S	+2.5 S ⊂ +1.0 Cyl. ax. 90°	+3.5 S	Eyes straight after 1 year.
10	M. T.	4	1 year	+4.0 S	+5.0 S	+3.5 S	+4.5 S	Almost straight after 2 months.
11	W. M.	9		+2.5 S ⊂ +3.5 Cyl. ax. 90°	+3.0 S ⊂ +1.5 Cyl. ax. 90°	+2.0 S ⊂ +3.0 Cyl. ax. 90°	+2.5 S ⊂ +1.5 Cyl. ax. 90°	Almost straight after 9 months.
12	O. Y.	4	1 year.	+2.5 S.	+2.5 S.	ibid	ibid	Improved after 2 months.
13	L. N.	6	4 years.	+2.5 S.	+2.5 S.	+2.0 S.	+2.0 S.	Straight after 4 mos. Hereditary strabismus.
14	D. M.	10	10 years	+6.0 S. ⊂ +2.0 Cyl. ax. 75°	+7.0 S.	+4.0 S. ⊂ +1.0 Cyl. ax. 75°	+5.0 S.	Straight after 20 months.
15	A. S.	9	9 years.	+2.5 S. ⊂ +0.5 Cyl. ax. 75°	+2.5 S.	+1.5 S. ⊂ +0.5 Cyl. ax. 150°	+1.5 S.	No improvement after 21 mos. Has not worn glasses for 1 year.
16	I. S.	8	2 years.	+3.0 S. ⊂ +1.5 Cyl. ax. 75°	+4.5 S.	+2.5 S. ⊂ +1.5 Cyl. ax. 75°	+4.0 S.	Straight after 2 mos. Only child. Doubtful heredity.
17	G. H.	3	6 mos.	+4.0 S.	+4.0 S.	+2.5 S.	+2.5 S.	Straight 6 yrs. On removing glasses eyes converge. Replacing become straight.
18	G. McM	8	Few mos.	+2.5 S.	+2.5 S.	+2.0 S.	+2.0 S.	Straight 1½ years.
19	B. G.	11	Childhood	+2.0 S.	+2.5 S.	+1.5 S.	+2.0 S.	Straight 3 months.
20	E. W.	7	4 years.	+2.5 S.	+2.0 S.	+1.5 S.	+1.5 S.	No improvement. Heredity.
21	M. S.	4	?	+4.0 S.	+4.0 S.	+3.0 S.	+3.0 S.	Good 1 year.
22	O. S.	9	9 years.	+1.25 S. ⊂ +0.25 Cyl. ax. 90°	+0.5 S. ⊂ +0.5 Cyl. ax. 90°	ibid	ibid	Almost straight 6 months.
23	E. R.	5		+0.5 S.	+0.25 S.	ibid	ibid	Straight 7 months.
24	A. N.	10	Birth	+2.5 S. ⊂ +1.0 Cyl. ax. 90°	+1.5 S.	ibid	ibid	No improvement.
25	K. P.	11		+1.0 S. ⊂ +0.75 Cyl. ax. 90°	+2.0 S.	ibid	ibid	Improved 1 year.
26	L. W.	5	3 years.	+3.0 S. ⊂ +0.75 Cyl. ax. 90°	+3.0 S. ⊂ +1.5 Cyl. ax. 90°	ibid	ibid	Almost straight 9 months.
27	G. M.	6	3 years.	+3.0 S. ⊂ +0.5 Cyl. ax. 90°	+2.0 S. ⊂ +1.0 Cyl. ax. 90°	ibid	ibid	Improved 1 year.
28	H. L.	6		+2.5 S.	+2.0 S.	ibid	ibid	No improvement. Wore glasses only 3 mos. Heredity.
29	C. M.	10		+4.0 S. ⊂ +0.5 Cyl. ax. 180°	+2.5 S.	+3.0 S. ⊂ +0.5 Cyl. ax. 180°	+2.0 S.	No improvement. Never wore glasses.

VII. K. B., female, 6 years. Sister E. B. (Case VI.)

VIII. P. B., female, 8 years. Sister E. B. (Case VI.)

IX. L. W., female, 13 years. One brother and one sister strabismus. This is a case of collateral heredity. (1 family; 3 children, all affected.)

X. A. W., female, 3 years. Sister L. W. (Case IX.)

XI. E. W., female, 7 years. Sister L. W. (Case IX.)

XII. L. R., male, 8 years. One brother and one sister strabismus. Three sisters normal. This is a case of collateral heredity. (1 family; 6 children, 3 affected, 3 not.)

XIII. F. R., male, 11 years. Brother L. R. (Case XII.)

XIV. L. E., female, 9 years. One sister strabismus. One brother and one sister normal. Parents normal. Paternal grandmother strabismus. She had twelve children, some with strabismus, number unknown. One of her normal sons had one strabismic daughter and two normal sons. This history is incomplete so far as the direct heredity is concerned, but the indirect heredity is shown. (2 families; 7 children, 3 affected, 4 not.)

XV. H. L., male, 6 years. Four brothers and four sisters normal Father's twin brother had strabismus, but father was normal. This is a case of indirect heredity. (1 family; 9 children, 1 affected, 8 not.) Case 28 in table.

XVI. A. L., male, 8 years. One brother and one sister normal. One brother strabismus. One brother nystagmus. This is a case of collateral heredity. (1 family; 4 children, 2 affected, 2 not. I exclude the nystagmic child, because while not strabismic, he was certainly not normal.)

XVII. C. B., female. Two sisters normal. Father strabismus. This is a case of direct heredity. (1 family; 3 children, 1 affected, 2 not.)

XVIII. D. K., female, 4 years. Sister Case III.

XIX. L. W., female, 9 years. One brother strabismus. This is a case of collateral heredity. (1 family; 2 children, both affected.)

XX. A. W., male, 6 years. Brother Case XIX.

XXI. A. M., male, 9 years. Father and paternal grandfather strabismus. This is a case of direct heredity for two generations. (2 families; 2 children, both affected.)

XXII. C. G., male, 12 years. One sister normal. One brother strabismus. One brother weak eyes(?). This is a case of collateral heredity. (1 family; 4 children, 2 affected, 2 not.)

XXIII. C. G., male, 12 years, twin brother Case XXII.

XXIV. G. L., male, 10 years. One brother strabismus. This is a case of collateral heredity. (1 family; 2 children, both affected.)

XXV. M. L., male, 8 years, brother Case XXIV.

XXVI. W. Z., male, 4 years. One aunt and one uncle strabismus. Parents normal. This is a case of indirect heredity (1 family; 1 child affected); also of collateral heredity (1 family; 3 children, 2 affected, 1 not).

XXVII. L. W., female, 4 years. One brother strabismus, two sisters normal. This is a case of collateral heredity. (1 family; 4 children, 2 affected, 2 not.)

XXVIII. E. B., male, 14 years. Mother strabismus, one brother normal. This is a case of direct heredity. (1 family; 2 children, 1 affected, 1 not.)

XXIX. M. C., female, 12 years. Two brothers strabismus, two normal. This is a case of collateral heredity. (1 family; 5 children, 3 affected, 2 not.)

XXX. E. Van H., female, 4 years. One uncle strabismus. This is a case of indirect heredity. (1 family; 1 child affected.)

XXXI. L. H., male, 3 weeks. Mother strabismus. This is a case of direct heredity. (1 family; 1 child affected.)

XXXII. P. D., male, 70 years. Six children normal. This is a case of di-

rect heredity. (1 family; 6 children, all normal.)

XXXIII. H. R., male, 57 years. One sister strabismus. One brother and two sisters normal. This is a case of collateral heredity. (1 family; 5 children, 2 affected, 3 not.)

Of the above cases, Nos. XXII and XXIII were especially interesting on account of affecting twin boys. I do not recall having read of any similar cases, tho they doubtless exist. Case XV also is interesting from the fact that although the father's eyes were normal, his twin brother had strabismus. The taint must have been very weak, as only one out of nine children were affected.

To summarize, there are twelve families showing direct heredity, with 35 children, of whom 15, or 43 per cent, were affected. Seven families showed indirect heredity, with 24 children, of whom 8, or 33⅓ per cent, were affected. Twelve families showed collateral heredity, with 48 children, of whom 27, or 56 per cent, were affected. It would seem from this that both in number of children affected as well as in percentage, collateral heredity is more dangerous. Next in importance comes direct heredity, while indirect heredity affects only one-third of the children in the families related to the patient.

NOTES, CASES, INSTRUMENTS

RETINITIS ATROPHICANS CENTRALIS — (HOLE AT MACULA).

CAPT. WILLIAM A. SEDWICK, M. D.
M. R. C.
BASE HOSPITAL, CAMP GRANT, ILL.

Private E. W., colored, laborer, aged 26 years, came to the Base Hospital Camp Grant, Illinois, March 5th, 1918, complaining of not being able to see out of right eye; some pain in the eye with twitching of lids and frontal headheadaches. Vision O. D. was 10/200. Vision O. S. was 20/70. Patient says that vision in right eye one year ago

Fig. 1. Sedwick's case of hole at macula.

was about the same as it was in left eye, 20/70. He admitted that vision had always been bad in both eyes since he could remember. His mother and father both died of tuberculosis, mother living two years after contracting it. Had one sister who died of tuberculosis, living only three months after contracting the disease. One brother living, but delicate. The patient had always been healthy save for an attack of typhoid fever two years before, from which he recovered, except that his left eye remained red for some months, and since then it becomes red every now and again. He denies syphilis, but admits one attack of gonorrhea five years since. He was refracted under homatropin but vision could not be improved in either eye with lenses.

Patient gave the following history: One year ago he was hit over right eye and forehead with a stick of wood 2x4 inches. He became unconscious and remained so for 26 hours. There was profuse hemorrhage from the nose and he vomited a large quantity of blood. He states that he was totally blind in right eye for three weeks. He was discharged from hospital after remaining there for three months. He then did light work and his vision gradually returned to what it is now. He has had constant headache just above the bridge of the nose.

Examination of eye showed cornea normal, pupil considerably dilated. Iris reacted very slightly to light and convergence. A small opacity of lens showed at the periphery, at about eleven o'clock. Vitreous was clear.

At the macular region there was an excavated spot a little more than half the size of the disc, deep red in color and mottled, with sharply cut edges and from a half to one millimeter in depth. Cholesterin crystals were imbedded in the surrounding retina in close proximity to the hole. There were none in the vitreous. There was a large scotoma. The nerve head was normal.

DATURIN, A CYCLOPLEGIC MYDRIATIC.

EDWARD JACKSON, M. D.

DENVER.

When the present war broke out one of the first drugs to increase enormously in price was atropin. The increase was not due to the fact that it was all made in Germany, but to the dependence of American manufacturers for their supply of a crude drug belladonna upon importation from Europe.

Meanwhile the commonest of weeds on the vacant lots of most of our cities is the *datura stramonium,* or "jimson weed" (Jamestown weed). An unlimited supply of it is at hand. All parts of the plant contain the active principle—the alkaloid daturin, chemically identical with atropin, and pronounced physiologically identical by some of the most careful investigators who have studied the subject. The leaves and seeds were long ago recognized in the U. S. Pharmacopoea.

My own comparative studies of it, published many years ago, seemed to indicate that its actions on the eye were the same as those of hyoscyamin and duboisin. But that, if these were not exactly identical with the action of atropin, that daturin was more nearly similar to atropin than either of the others, in that it acted rather more slowly and was accompanied by less constitutional disturbance.

A good deal of clinical experience with daturin shows that its mydriatic cycloplegic and therapeutic properties are indistinguishable from those of atropin. It is a drug not generally referred to in the text books on ophthalmology, and one that has never been exploited by manufacturers who had succeeded in controlling the market for the raw material. Being sold in comparatively limited quantities its price at the outbreak of the war was five or six times higher than that of atropin. But since the latter has equalled or surpassed it in price there seems to be no good reason why daturin should not come into much more general use.

It is certain that the American supply of the drug could never be interfered with by foreign war. And if it were commonly used the increased demand, with the free supply of raw material, would certainly bring down the price. It seems to be simply a question of fashion or custom in the medical profession, as to which they will use or prescribe.

SOCIETY PROCEEDINGS

NETHERLANDS OPHTHALMOLOGICAL SOCIETY.

June 9-10, 1917.

DR. NICOLAI in the Chair.

Translated from the Nederlandische Tijdschr. v. Geneeskunde by E. E. Blaauw, M. D.

The oration, which C. U. Ariens Kappers gave by invitation "About Phenomena of Neurobiotaxis of the Optical System" has already been published (p. 518).

The Dilatator of the Pupil.

NICOLAI spoke on the dilatator pupillae with demonstration of the fibers believed to exercise such a function.

DISCUSSION.—Rochat objects to accepting as the cause of the dilatation of the pupil the rare dispersed fibers of Nicolaï. The membrane heretofore considered as the dilatator can be observed especially well in the calf's-irides, after the colored pigment layer is removed. A compact membrane of smooth muscle is then seen extending over the entire back of the iris. It is much easier to understand that this membrane produces dilatation of the pupil, rather than the rare muscle fibers of Nicolaï. The reaction of van Gieson is not enough to recognize cells as smooth muscular fibers.

Nicolaï denies the thinness of the fiber groups which he has described as a dilatator. He seriously doubts the muscular nature of the membrane of Henle on account of the dubious staining, by methods recommended for muscular tissue.

De Kleijn considers the physiologic arguments against the existence of the dilatator pupillae at the location of the earlier investigators not entirely sound. The objection of an ectropion pupillae during narrowing of the pupil, because then also a contraction of the antagonist occurs, is not real. During late years, from the investigations especially of Sherrington, it seems that during contraction of a muscle the antagonist does not contract, but actively relaxes. It must yet be investigated if this is also valid for the sphincter and dilatator with their peculiar innervation. The existence of a pupillary dilatation at a time that the dilatator is not yet formed, can be explained very well thru loss of tone of the sphincter thru atropin. Nicolaï accepts that as a rule tonic tension of the antagonist occurs during contraction of a muscle, and that also an innervation of the dilatator occurs during contraction of the sphincter.

De Kleijn considers this opposed to Sherrington's investigations, and he can add the observation of an active relaxation of the internal rectus in nystagmus, accompanied with the contraction of the external rectus.

Panophthalmitis from Gram-negative Diplococci.

J. van der Hoeve observed a 14 year old boy with a rather mild conjunctivitis, in which abundant diplococci were found in smears which proved in cultures gonococci. After one day of treatment no gonococci could be found, and after 5 days the boy was entirely well. He points out the importance of bacterial investigation, as this boy could very well infect people with less resistant conjunctivas.

He then demonstrated Gram-negative diplococci which have not before been described in connection with the eye. These had produced in one child

a panophthalmitis of one eye, and perforating keratitis of the other; and in another child of the same region a panophthalmitis of one eye. They appear different in cultures from meningococci. They grow slowly and form on agar-agar at 37° mucous glassy transparent cultures. Bouillon becomes turpid at 37° in 48 hours; blood serum retards the growth (Prof. Klein). They are not pathogenic for white mice, for the body. For the eyes, however, they are very dangerous. Scratches over a rabbit's cornea with an infected needle produce keratitis. Intracorneal injection produces keratitis with iritis, which always recovers spontaneously. Injection in the vitreous produces serious panophthalmitis within 24 hours. followed by swelling of the bulb and perforation. The diplococcus from the conjunctiva, cornea and vitreous of the infected eyes can again be cultured.

The only known organism wherewith this diplococcus corresponds, is the diplococcus mucosus Leipzig, described by Stephan, who does not mention it as the cause of ocular affections.

Discussion.—Rochat asked if we have to deal with a new organism.

Van der Hoeve confirmed this. He also mentioned that the influenza bacillus of Pfeiffer has been left more in the background in later years.

Kuynders asked Prof. van der Hoeve if he had seen a case of panophthalmitis in cerebrospinal meningitis, where we must admit that the inflammation is caused by the Gram-negative meningococcus.

Van der Hoeve has lately observed two such cases; they originated endogenously. The meningococcus in the conjunctival sac is on the contrary usually nonvirulent.

Crystalloid Formations in the Retina with Disturbance of Field of Vision.

P. J. Waardenburg was consulted by a 21 year old lady, who did not see well with L. E. since some years ago. R. E. is normal. Vision, L. E., fingers at 1.5 m.; no improvement with lenses. No general disturbances, nor hereditary ones. The disc in L. E. is not sharply limited with temporal paleness. In its center is a white tissue, which continues as a strand covering the inferior temporal artery for a length a little longer than the disc diameter. A white spot touching the disc downward and toward the nasal side has a size about 4 to 5 times the disc and shows a somewhat irregular, nonpigmented margin, while it is not elevated above the surroundings. The inferior nasal artery courses over it giving off branches, which are directed nasally. Also some very fine nasal arteries pass over. They are already thin outside the focus on the disc.

The surface looks craterlike. It seems to consist of a number of round globules and pits, separated by furrows and somewhat elevated walls. The color is china like glossy, white to blue white. The pits and globules are certainly not deep and high. The vessels which cross them do not show curves, nor where they leave the focus and pass in the retina. The yellow spot looks normal, with rather few vessels. The patient does not know if she ever saw with L. E. She is able to fix the center of the perimeter, sees people for their upper part very indistinctly. Color-discs of 1 cm. are recognized at ½ m.

The field of vision is concentrically limited: a distinct difference exists between the part above and the part below the horizontal raphe of the retina. No colors are observed in the part above the raphe, while the white becomes at once very indistinct. In the lower part of the field the color limits are nearly normal. An absolute paracentral scotoma is present, which is broken thru toward the periphery. This compasses the entire papillo-macular bundle and also the disc, and is much larger than the enclosed retinal focus. The limits of the absolute scotoma are given very accurately, the lower border goes to near or in the fixation point. A relative central scotoma is present. The upper part of the visual field consists therefore of two parts, one absolute scotoma going out from the papilla, which is connected with the peripherally limited part of the field, and one outside relative scotoma. The fun-

dus shows only a juxtapapillar change, but no change which can account for this disturbance of the field.

For two years the picture has not changed; now a swelling of the papilla has appeared, so that the margins are more hazy and a retinal hemorrhage is seen about three disc diameters below the papilla, at the side of which membranes have formed which hang from the retina in the vitreous. Also thread-like opacities are seen in the vitreous, which are movable, most probably a result of the old condition. Treatment has had no success, which could be expected: Pirquet test and blood Wassermann negative. The described retinal focus has the most resemblance to the description of formations in the disc given by Niëls Höeg (von Graefe's Arch. f. Ophth. Bd. lxix, 1909, 355-389); and considered as drusen of the optic nerve head, which anatomically seem to be amorphous hyalin masses, without cellular nature and very slow growth.

Waardenburg has formed the following idea of the course of the process: At some indefinite time after birth the L. E. has become affected with a serious neuritis, which being probably also retrobulbar, produced limitation of the visual field thru destruction of the papillomacular bundle, and the directly contiguous fibers, so that the fovea centralis also became affected. These fibers are not entirely destroyed as a certain amount of central vision has remained. From the papilla along a vessel a retinitis proliferans has developed, which proves the intraocular progress of the process. This is also proved by the large crystalloid focus in the retina next to the disc. The destruction became still larger thru this focus. Then all nervous elements have disappeared or have a weakened function peripherally from the focus. The etiology is obscure.

The case completes the observation of Niëls Höeg as it describes a crystalloid focus in the retina only, next to the papilla and also makes it clear that the focus must be considered a complication.

Influence of Calcium Chlorid on Experimental Conjunctivitis.

A. DE KLEIJN and G. TEN DOESSCHATE.

It is a well known fact that calcium chlorid exercises an influence on the formation of exudates and transudates. Experiments with instillation of oleum sinapis or abrine solution in conjunctival sacs of rabbits, with the presence of much calcium chlorid in the organism, showed absence of the normally present irritability of the mucous membrane. Calcium lactat comes next to the chlorid. The protecting action appears two hours after subcutaneous injection, which action lasts only 24 hours. Strontium, in many respects related to calcium, does not seem to possess this action.

This peculiar influence of calcium chlorid on the conjunctiva was demonstrated in the class in pharmacology at Utrecht by Prof. Magnus and Dr. Storm van Leeuwen, when it was found that the animals treated with calcium chlorid with later instillation of oleum sinapis generally acquired panophthalmitis with consequent phthisis.

The speakers have repeated these experiments. At 1 p. m. 5 cm. of a 5 per cent solution of calcium chlorid per kilogram was injected subcutaneously in the rabbit. This injection was repeated 4 hours later, and the next morning at 8 o'clock. One hour later a little oleum sinapis was put in the conjunctival sac. The animals, which had received no calcium chlorid, showed a strong chemosis, and an extensive defect of the corneal epithelium; which however healed quickly, leaving no signs except in one case where a corneal macula remained. The animals injected with calcium chlorid, hardly showed any reaction to the oleum sinapis. But a severe inflammation occurred later, which progressed in one case to panophthalmitis. A number of eyes were enucleated at different times after the treatment and showed the following: The conjunctiva of a rabbit treated showed no changes except slight redness. A day after the instillation there was a corneal ulcer, and, microscopically, an extensive destruc-

tion of the corneal epithelium. A rabbit treated in the same way showed later a severe ocular inflammation, and the eye enucleated after 8 days, while the cornea was very opaque, and pus in the anterior chamber, showed microscopically extensive loss of corneal epithelium, and numerous polynuclear leucocytes in the corneal tissue, anterior chamber and iris. The posterior segment of the eye was lost. Animals not treated with calcium chlorid reacted with severe chemosis, which showed in the specimen on the same day only much conjunctival swelling. An eye enucleated on the second day showed purulent secretion and extensive loss of corneal epithelium, and a marked infiltration of cornea and conjunctiva with the absence of epithelium. After 9 days the cornea was again nearly clear, only some leucocytes and small vessels being found. Later eyes show no more changes.

These observations show the need of care in the use of strong remedies in the eye, after the use of calcium. Absolute conclusions cannot be drawn as the calcium was given subcutaneously.

Chronic Headache as an Asthenopic Symptom.

J. P. VAN DEN BRUGH treated of muscle imbalance and the symptoms produced by muscle anomalies. He thinks that the chief primary cause is an abnormal insertion of the muscles in the globe. He considers particularly the disturbances due to a low degree of esophoria. Even two degrees requires great exertion of the divergence. The sufferers with esophoria and hyperphoria have those different complaints, which are so well known in the United States for the last twenty years. He has had 58 cures in 71 cases. The prisms with the base out should be put on directly in the morning and constantly worn during the day. The highest prism given was of 5 degrees divided over the two eyes. Suggestion can be excluded. Cyclophoria is very difficult to treat. The family physician can find out if the eyes are the cause of the headache by letting his patients go around with one eye bandaged.

DISCUSSION.—Verwey is convinced that prism glasses often can do much good, but we should not forget that many people have latent disturbances of muscle balance without trouble. Some years ago he investigated the influence of the field of regard on the position of equilibrium of the eyes, when he found that heterophorias of low degree can be corrected easily thru inclinations of the head. It should not be enough to determine the latent positions, but we should try to explain them. A direction could be found in the important facts elucidated by Ariöns Kappers, especially the connection between the place of the nuclei of the eye muscles and the fasciculus longitudinalis posterior, which controls the direction of regard and of the nuclei of the vestibular nucleus.

With the instrument of Hess, latent disturbances in different directions of regard can be easily demonstrated. If now the position of the semicircular canals in regard to the direction of gravity has an influence on these heterophorias, then another figure must be found with different positions of the head in regard to the vertical line, with the understanding that one must go out from the primary position with regard to the orbit. Perhaps such investigations would help us in understanding the causes of strabismus.

Lans has for half a year had his attention drawn by van den Brugh to the favorable results of prismatic lenses, with beneficent results for his patients. Van den Brugh wishes to know if attention is paid to symptoms of functional nervous diseases.

Van der Hoeve found many imbalances in normal students; as a rule latent convergence for far-off, and latent divergence for near by seeing. He thinks that the disappearance of the headache after closure of one eye is difficult to understand as a symptom of fatigue; one should in such a condition expect rather a slow amelioration.

Nicolaï points to night headache, which could raise a doubt as to the connection with these disturbances of the muscle balance. He also has seen cures from wearing prismatic lenses.

Waardenburg asks if van den Brugh has any experience regarding patients with exophoria, suffering with headache, where the exophoria from time to time becomes manifest strabismus, where therefore an insufficiency of the convergence is present.

Otto Roelofs has done more than 250 determinations of the rest-position, which show the great multitude of deviations and the large amount. He found the same as van der Hoeve in students. In the policlinic patients he found as a rule a divergent rest-position. He was able to explain this difference between the students and the dispensary patients only by the influence of their way of working.

Van den Brugh in replying mentions that large deviations of the rest-position are found without complaints. These appear as soon as the compensative power becomes lacking. He has no experience regarding the position of the field of regard or the deviation of the rest-position. He would recommend for a strong latent divergent strabismus the use of prisms. It was interesting that not only sufferers with continuous chronic headache, but also those who get a headache in church or in the theater or in a movie, were entirely cured by prisms.

Prof. van der Hoeve then showed the instrument of W. R. Hess which is a very handy instrument for the diagnosis of deviations of ocular muscles, especially paralyses.

The celebration of the twenty-fifth anniversary was more specially held during the meeting, when the president recalled in general the founders, those who had died and the work done. He then gave the floor to one of the founders, the honorary member Dr. F. D. A. C. Moll, who gave the solemn oration, commemorating the first constituent meeting on June 12, 1892, at Rotterdam. The Society began with 34 members and counts now 85. He recalled the 16 members who have died, and then gave a rather general talk, insisting on the value of the esthetic and ethical education of the physician; how the university does not develop this and how important it is as the physician is for all a man, who should lead on account of his position and scientific education. He then mentions the revision of the educational career, which is in prospect and that the humanistic education has values so that the study of the old languages should not entirely be thrown overboard.

Dr. G. F. F. Rochat gives a historical picture of some three centuries ago of the ophthalmologist, following the Ophthalmodouleia of George Bartisch, which appeared at Dresden in 1583, a book that still a century later was reprinted.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

Clinical Meeting, May 13, 1918.

President Dr. Heman H. Brown in the Chair.

Sympathetic Ophthalmia.

Dr. Thomas Faith reported the following case: D. S., Italian laborer, age 38. This patient, whom some of the members had previously seen, was injured by a foreign body in 1915. He was under the care of an ophthalmologist for about two months, and was discharged as recovered or rather out of danger, as the eye was quiet. However, he noticed that his vision was gradually failing, and on July 24, 1915, he applied to the eye clinic at the Illinois Eye and Ear Infirmary for treatment. He saw Dr. Robert Von der Heydt, who found vision in the right eye 20/30; in the left eye 15/200. A diagnosis was made of a piece of steel in the vitreous of the left eye.

For some reason the patient did not return to the infirmary and received no further attention until January 23, 1918, when he was sent to the speaker on account of a slight injury to the left eye, caused by being struck with a piece of ice. There was no abrasion of either the lid or eyeball, but a contusion of the upper lid and an ecchymosis of the conjunctiva. The patient complained of increased cloudiness of vision, which at this time was light perception only, his pupil was fixed and would not dilate with cocain and homa-

tropin and his tension was 48 mm. He did not complain of pain and there was no ciliary tenderness.

He was immediately sent to the hospital and was put upon hot applications, dionin 5 per cent, and salicylat of soda. After a few days of this treatment it was decided to do iridectomy, thinking the patient had a secondary glaucoma due to annular posterior synechia; and as he had been told by the patient, that the gentleman who first saw him had radiographs made, and assured him there was no foreign body in the eye. The above information was obtained after he had done the iridectomy, and it had not relieved the tension as he had anticipated. Accordingly, X-ray and Sweet localization showed a foreign body in the anterior segment of the eye.

He showed this case at the March meeting of the Society and two days later he enucleated the eye. On March 29th the patient complained of pain in the right side of the head, and there was some injection of the right eye, but not pronounced and not deep. There was no tenderness in the ciliary region and no pain in the eye. The pupil dilated fairly well with cocain and homatropin. There were some deposits on Descemet's membrane; vitreous cloudy; vision 20/40 with correcting lens. Patient was given salicylates gr. xxxx, inunctions of mercury, gr. xx per diem. Blood count at this time showed a marked increase in the lymphocytes. The treatment was continued, both salicylates and inunctions being increased in amount. The patient had very bad looking teeth. They were covered with tartar, and the speaker advised that they be scaled so that the gums and teeth could be kept clean. This was done, and it seemed to have a marked influence upon the eye condition as improvement was rapid afterwards. The vision has never gone below 20/60 and it is now 20/20 with correction. The deposits are disappearing from Descemet's membrane, and the patient is going to have a good eye, a rare result after sympathetic disease.

In looking over the literature, the speaker has found that Jampolsky in 1915 reported eight cases of sympathetic ophthalmia, which occurred in the Fuchs clinic after enucleation of the injured eye. In one of these the eye was enucleated 18 days after the injury, and the sympathetic disease began 12 days later. The longest period after enucleation in which sympathetic disease began was 38 days, twenty-nine days having elapsed between the time of injury and enucleation.

In addition 33 cases are gathered from the literature. The summary of ultimate results in these cases fully supports the conclusion of the Committee of the Ophthalmological Society of the United Kingdom, that after such removal of the injured eye, the prognosis is much better than where the sympathetic disease has appeared before removal of the injured eye. Of the whole group, 60 per cent recovered good vision.

Discussion.—Dr. M. H. Lebensohn stated that he had had a number of cases of sympathetic ophthalmia. One he recalled in particular was a boy six or seven years old, who was brought to the Illinois Charitable Eye and Ear Infirmary with a history that the boy's left eye was hurt about four and one-half weeks ago in playing with a brother. How the accident happened the mother could not tell, only she noticed that he could not see with that eye. There was a small scar in the lower border of the cornea. The eye was not red or painful at any time. On examination he found not only was the left eye (the injured eye) blind, but there was a fully developed sympathetic ophthalmia in the right eye. The following day the left eye was enucleated, and half of a pearl button was found in the vitreous. The enucleation did not stop the progress of the sympathetic disease, and the boy in the course of about three or four months became totally blind.

The only thing that the speaker found during the treatment of this case, and several others cases he had treated, that gave even temporary relief, or that seemed to stay the progress

of the disease for a time was injections of cyanid of mercury, 1-1000 injected both in the orbit and in the subconjunctiva. He advised the members to try this agent in addition to other means of treatment.

Dr. Michael Goldenburg, in referring to the case of Dr. Faith, stated that possibly better results were obtained following enucleation previous to the onset of the sympathtic ophthalmia. He had a case on his hands now that he had seen off and on for seven or eight years. A little girl in returning home from school passed near a bonfire, some boys threw bullets into the fire, causing an explosion. A piece of shell entered her eye. She was brought to the Infirmary in a few hours thereafter and within 24 or 48 hours the eye was enucleated. About 16 or 18 days later sympathetic ophthalmia developed in the other eye. For a period of six or seven years she had had 12 or 18 attacks of sympathetic ophthalmia. These attacks had varied in their severity. At times her vision in that eye became absolutely nil. Even perception of light was gone. She had had on three or four occasions optic neuritis.

It was a question whether this was sympathetic ophthalmia. Every sort of examination, test, X-ray, every laboratory method known, had been tried to ascertain whether any other factor could have influenced this condition; but he had not been able to find out anything definite. The vitreous humor was filled with an exudate to such an extent that the speaker could not get the light reflex at the time, and in the course of a few weeks or months it would clear up, so that he could not find any evidences of the previous condition. He had seen the patient within the last two months, and with correction, which was rather high, three or four diopters plus, she got 20/25 vision. She had come back with attacks so frequently that he would not be surprised to see her with no vision at any time.

Dr. Heman H. Brown asked whether in these various attacks the treatment was uniform.

Dr. Goldenburg replied that at first he tried treatment similar to that mentioned by Dr. Faith. He gave the salicylates and mercury; he also gave potassium iodid, prescribed sweats and purges, then subconjunctival injections, and even tuberculin. A tuberculin test was made, and the treatment that gave the best results was inunctions of mercury. He excluded very carefully luetic infection. Her sinuses were X-rayed, and her teeth and tonsils were carefully examined.

Dr. Robert H. Buck stated that in connection with these inflammatory cases due to local infections, he might cite a case that came into the office recently. This patient had had recurrent attacks of iritis. At the time he came in he had an attack of iritis for two weeks. On examination it was found that the patient had a bridge on one side of his mouth, and one tooth in that bridge was abscessed. Following extraction of the tooth the iritis cleared up in two or three days.

Dr. Thomas Faith stated that most of the severe cases of sympathetic ophthalmia were in children. He did not believe that we got any such results in children as in adults. He did not recall ever seeing a case in which normal vision was recovered, although he knew of a number of cases reported. Most of the cases he had seen had been in children.

If one studied all these cases of iritis, he could not help but be impressed with the fact that many of them had two or three different elements in helping to cause the trouble. One saw so much in the literature these days regarding the influence of focal infection in producing uveitis, that one was likely to conclude that he had to completely rearrange his percentages. These cases in Fuchs' clinic had been studied carefully, and whether they were all adults or children, he was not able to say.

The Committe of the United Kingdom, that had gone over the subject very thoroughly had come to the conclusion that after the removal of the injured eye the prognosis was much better than where the sympathetic

disease had appeared before the removal of the injured eye. Certainly, we could not promise patients that we could save them from having sympathetic ophthalmia. We could promise them, in all probability, that the sympathetic disease, should it occur, would be less severe than if the eye was allowed to remain.

A Case of Ectopia Lentis with Family History.

DR. WILLIAM K. SPIECE reported the following case:

H. C., aged 7. His school teacher noticed his poor vision and sent him to the school physician. The physician noticing the iridodonesis referred the boy to the speaker as an interesting eye case.

On examination his vision was found to be R. 5/100; L. 5/100.

Iridodonesis was very noticeable, especially following movements of the eyeball. The anterior chambers were deep, more so on the aphakic sides. With oblique illumination, both lenses were seen to be dislocated upward and outward, leaving a small crescentic aphakic area downward and inward. No zonular fibers were to be seen and the lenses were clear. Following the use of atropin a satisfactory retinoscopic examination of the aphakic area was made, but not of the phakic portion.

Glasses improved his vision as follows:

R. + 10.00 D. ⌒ + 2.00 D. c. ax. 90° = 20/200.

L. + 13.00 D. ⌒ + 1.00 D. c. ax. 90° = 20/100.

The nasal side of each fundus could be seen fairly well. Aside from the right disc appearing somewhat pale, they were negative.

About two weeks after the use of the cycloplegic the pupils were again normal in size. His vision with glasses was then: R. 20/200; L. 20/100.

His mother presented a pair of spectacles which she said had been prescribed by a physician about a year ago, but they had not been satisfactory. They were: each —1.50 D.

His mother said that her eyes were similar to her son's, and on examination such was found to be the case. She also reported the case of a sister whose eyes were in a similar condition.

Mrs. Albert C. (the mother), aged 38. On examination iridodonesis was noticed following ocular movements, and the cover test showed an exophoria of 3 mm. The vision is R. E. 10/65; L. E. 10/200.

Following the use of homatropin the lens of the right eye was seen to be dislocated upward and outward. The left lens was in position. After retinoscopic examination glasses improved her vision as follows: R. + 5.00 D. = 20/50; L. + 5.00 D. ⌒ + .50 c. ax. 90° = 20/20 —1.

The examination of the left fundus showed a disseminated choroiditis with an atropic area just above and to the nasal side of the disc which, on first appearance suggested a movable lens.

Elsie C. (sister), aged 9. R. 20/32; L. 20/65 —1. Ophthalmoscopic examination of the left eye revealed a bleb or vesicle about 2 mm. in diameter, centrally located on the posterior surface of the lens.

Mrs. G. aged 27 (the aunt; mother's sister). Examination reported by Dr. E. A. Westcot, Manistique, Michigan. Left eye, divergent squint about 30°. Both anterior chambers deep. Both irides tremulous. R. 8/100 with + 8.00 D. = 20/60; L. 2/100, not improved by glasses. On dilating the pupils one saw with the ophthalmoscope the upper outer edge of each lens. The right lens was transparent, and in the left there was beginning cataract. Could only see the fundus past the edge of the opaque lens. She had a son, aged 6, whose eyes were in a similar condition.

Geneology of H. C.:

Six (6) children, 2 brothers and 3 sisters.

Brother, aged 12; V., R. and L., 20/20, Hm. .25.

Brother, aged 10; V., R. and L., 20/20, Hm. .25.

Sister, aged 9; V., R. 20/32; L. 20/65 (L. Post. Polar vesicle).

Sister, aged 7; V., R. and L., 5/100.
Sister, aged 5; V., R. 20/30; L., 20/50 neg.
Sister, aged 1; ⅓ negative.
H.'s father, eyes good.
H.'s mother, eyes poor (same condition, unilateral).
H.'s maternal uncles (3)—
Aged 36, living, eyes good.
Aged 20, dead, eyes poor.
Aged 4 mo., dead.
Mrs. C., 38.
H.'s maternal aunts (4)—
Aged 33, living, eyes good.
Mrs. B., aged 27, living, eyes poor; son aged 6; poor eyes.
Aged 20, living, eyes good.
Aged 6 mo., dead.
H.'s maternal grandfather, aged 60, living, eyes good (has no brothers or sisters).
H.'s maternal grandmother, 52, dead, eyes good (one brother only; good eyes).

Discussion.—Dr. Frederick D. Vreeland mentioned a case that Dr. Joseph Beck reported at the Cook County Hospital. In this case the lens was dislocated, and he described the other eye as having the lens outside of the iris against the cornea and the lens entirely clear. Dr. Vreeland did not recall having seen such a case, neither did Dr. Darling.

Dr. Lebensohn thought Dr. Woodruff had operated on a case of this sort at the Infirmary some three or four years ago in which he delivered the lens. In this case the condition was congenital. The patient was 11 or 12 years of age.

Dr. Vreeland stated that this patient to whom he had referred had been under the observation of Dr. Beck for two and a half years.

Dr. Robert H. Buck recalled a case that came into the Infirmary about a year ago, in which there was a dislocation of both lenses, which were floating free in the vitreous. As the patient moved the eyes, the lenses would come up before the pupil and then drop back again, so that one could just see the upper edges of the lenses.

Dr. William K. Spiece, in speaking of the cause of this developmental defect, stated that in reading the literature he found that some of the writers had endeavored to put forth ideas as to the cause. Two of them assumed somewhat the old woman's idea that the cause for all these defects was similar to that of birthmarks. One writer in the Wisconsin Medical Journal, in reporting a series of cases of ectopia lentis in a large family, gave the father's idea as to the cause of it and it was simply this: In his earlier years, when he first got married, he was quite poor, and the mother had to do the work, the drudgery of the household, and for that reason it left an indelible impress upon the children. This explanation of the cause did not appeal to the speaker very much, any more than the old woman's idea of the cause, birthmark.

Several other writers had advanced ideas along the line of eugenics which appealed to him. Whenever any one began to discuss eugenics they referred to Mendel's law. Mendel was a naturalist. He did his work principally in the garden. He was ingenious and conducted a series of experiments with different vegetables unselected and worked out the different characteristics of plants, and from these experiments he developed the so-called Mendel's law. According to Mendel, we have the traits, dominant characteristics and recessive characteristics, and one might say in this instance a normal eye would be the dominant characteristic, and the abnormal eye would be the recessive. Mendel laid down the law that the recessive trait bore the proportion of one to four to the dominant. Three times normal would develop the dominant characteristics, and once a recessive, and in all these cases that had been shown the proportion came close to that, about one to four.

One or two other writers stated that this never occurred unilaterally. But here was one case where it did occur unilaterally. Parsons in his pathology had said it occurred unilaterally, and cited such a case. The sister had a posterior polar vesicle which was the same type.

However, it had not progressed so far as in the other cases, but it was undoubtedly of the same type. The trouble was with the development of the zonular fibers, the suspensory ligament of the lens. There was no trace of any zonular fibers, and the speaker thought that this case was of the same type as in the mother, the boy, the aunt and cousin. Then possibly one thing more might be said, namely, what were we going to do for it? Most of the writers contend that if there be useful vision it was better to leave them alone. If their vision was very poor, some authors recommend needling.

Dr. Michael Goldenburg spoke as to what should be done for these cases; saying, that some maintained that vision was not improved by operative procedure, and further that the function of accommodation was lost by this interference. He was firmly convinced that given a case not possessing useful vision, by which he meant 20/100 or better, we should resort to discission of the lens. He felt sure that a majority of these cases would show an improvement in vision in time. He had had a number of such cases that justified such a deduction.

With reference to the development of vision, he reported the case of a young man who had been under his observation for about ten years. When he first examined him his left eye disclosed a marked choroiditis, persistent pupillary membrane, and coloboma of the iris, with no vision. In the right eye the fundus was negative, with 20/100 vision, improved to 20/50 with glasses. Today the patient had better than 20/20 vision in the right eye, and no improvement in the left. He was now one of the leading professional baseball players in the big league.

He recalled the case of a young lady who was now 28 years of age. She was under the care of the late Dr. Beard some twenty odd years ago, who at that time performed an optical iridectomy in each eye, but did not touch the lenses. He saw the young lady first when she was 23 years of age; she had the mentality and facial expression of a child of 12 or 14, and would sit on the floor and play with the children; she paid no attention to her appearance, and did not seem to take any interest in things expected of one of her age. Her vision at that time was counting of fingers. Today she had 22/100 in each eye and was able to come down town alone. Her appearance, her mentality, and her interest in things about her were most gratifying.

Buphthalmos.

Dr. Robert H. Buck reported the case of a child that was brought to the Infirmary when six months of age. The buphthalmos was pronounced. Both corneas were hazy. The child seemed to notice bright things. If one held a bunch of keys she would reach for them. On account of the condition seemingly progressing and being likely to result in total blindness, both eyes were trephined. The result was gratifying, in that the corneas cleared up in a few weeks. At present she was 18 months of age, could walk around the room, and avoid striking the furniture, or she would approach a person when called. He did not take the tension at the time of the operation, and since then he had not felt justified in anesthetizing her to get the tension, so it had not been done. So far as one could tell from external examination, the eyes seemed clear, and the patient seemed to be developing more vision as time went on. He did not know exactly what the diameter of the cornea was at the time he operated. But it was his impression that the cornea in each eye was getting larger within the last three or four months. [See below.]

Peripheral Iridectomy Combined with Scleral Trephining.

Dr. M. H. Lebensohn stated that in reporting this case he had nothing especially new to offer excepting the broad peripheral iridectomy combined with scleral trephining, which he considered a more desirable and satisfactory operation, and was equally useful in acute and chronic glaucoma. He had operated by this method on five patients; on four, one each eye, and on this patient whom he was presenting tonight on both eyes. Mrs. E. B.,

aged 55, entered the Infirmary February 10, 1918, with a history of progressive failing vision in both eyes for about a year. The tension of the right eye by a Schiötz tonometer was 80; left eye 60. The corneas were steamy, and the anterior chambers very shallow, and pupils dilated. The fundi could not be seen. Vision in the right eye was 22/100; in the left eye light perception only. The vision gradually improved after the operation and was now for the right eye 20/50 without any correcting lenses; and about 21/120 in the left. The tension taken repeatedly was 21 in the right eye, and 18 in the left. He had had the same favorable results in the other four patients.

Col. Elliot, who popularized the operation of trephining for glaucoma, did not advise iridectomy excepting to cut off the prolapsed iris. It was known that in chronic glaucoma especially many times the tension might remain down for a short time, but it would rise again and necessitate another operation; while if one made a broad iridectomy the tension would remain down permanently and the danger of late infection was not increased because the scleral wound was not any larger than in a simple trephining. Hence, whenever a scleral trephining was indicated in glaucoma, a broad iridectomy should be done at the same time. It was much safer than an iridectomy ordinarily performed, as there was no danger of injuring the lens.

Discussion.—Dr. Lebensohn, in discussing the case of Dr. Buck, stated that he had resorted to scleral trephining in a child a year and a half old. The baby was brought to the Infirmary at the age of seven weeks with congenital cataracts in both eyes. There were repeated needlings in both eyes. She developed buphthalmos in the right eye, and tension was 58. He did a scleral trephining six years ago, saw the child for six months after that, and now he saw the child every few months. Tension had remained very good since the operation. The child had useful vision. The other eye was repeatedly needled, and there were no complications.

Dr. Thomas Faith would like to know about the character of the glaucoma; and if the doctor had run across any case in which he was unable to deal with the iris on account of adhesions to the posterior surface of the cornea. He recalled one case of scleral trephining which argued strongly for a broad iridectomy. A woman came to him in 1911 with glaucoma in both eyes. He did a double scleral trephining. In one eye he got a good sized opening in the iris. It was a nice peripheral iridectomy. In the other eye the opening in the iris was smaller and could only be seen when the eye was rotated up. The tension in the eye with a larger peripheral iridectomy was always from six to ten points lower than in the other. The size of the conjunctival bleb was always larger in the one in which the peripheral iridectomy was larger. He had seen that case once in two or three months since 1911. She had preserved her vision, although she had had attacks of violent conjunctivitis in which the pneumococcus was found in the conjunctiva, but she had had no trouble so far as deep infection was concerned.

Referring to the case of Dr. Lebensohn which developed buphthalmos, the speaker was under the impression that buphthalmos was congenital, and he wanted to know why Dr. Lebensohn did not classify this case as one of secondary glaucoma.

Dr. Robert H. Buck stated with regard to this case of buphthalmos, he was unable to make an ophthalmoscopic examination, but he could see enough to determine that there was not a cataract in either of these eyes. As to broad iridectomy, he did broad iridectomies in both eyes.

As to Dr. Lebensohn's case, he saw this patient when she first came into the hospital and on examination he found that both corneas were very cloudy. They were now perfectly clear. The iridectomy in the left eye was perfectly clean, that is, there was a pillar to the iris on either side, while in the right eye it seemed the iris had

prolapsed into the trephine opening, pulling up the pupil.

With regard to getting a broad iridectomy thru a trephine opening and getting a good hold of the iris thru the opening, he had used a two millimeter trephine, and in so doing generally found that the iris prolapsed sufficiently so that he could take hold of it, pull it out, and do the trephining quite readily. He had a patient, 24 years of age, with buphthalmos that began in childhood, and at the time he saw her the cornea measured 30 millimeters in diameter and protruded 15 millimeters. The bulging was so great that it was decided to enucleate both eyes because of the intense discomfort, and vision was absolutely nil.

Dr. Faith, in working on one of the advisory examination boards, stated that he had seen two cases of buphthalmos in men brought up for the draft. One of them was a case on which Dr. Patillo did an iridectomy when the boy was 12 or 14 years of age; and as far as Dr. Patillo knew vision had not deteriorated since the iridectomy was done. Both eyes were involved and iridectomized, and the result was a good one, but vision was not good enough for him to be accepted for the draft.

ABSTRACTS.

Collins, J.—The Nervous Manifestations of Syphilis of the Eye.—(Amer. Jour. of the Med. Sciences, May, 1918.)

The writer gives the results of an analysis of 790 cases of syphilitic disease of the nervous sytem observed at the Neurological Institute of New York City. One-half of these were examples of tabes and general paresis and in 335 of these 395 cases the size, shape and circularity of the pupil were disordered. He regards disorder of the circularity of the pupil, in the absence of obvious attributable cause, such as iritis, scleritis or similar inflammatory conditions, as suggestive of syphilis; and a warrant for the study of the cerebrospinal fluid, although it must be admitted that such alterations do occur in healthy individuals. Uhthoff found such anomalies in two per cent of 14,392 cases; others who investigated much fewer cases found a larger percentage—Ivanhoff, 9 per cent; Mantoux, 5 per cent; Dufour, 4 per cent.

Collins found Argyll Robertson pupils in 467 of the 790 patients; he considers failure of the pupil to react to light as the only infallible sign of syphilis; in 25 years' experience he has never encountered the Argyll Robertson pupil in a nonsyphilitic individual. He points out, however, that isolated cases have been recorded by Mees, Margulies, Nonne and others, in which such phenomenon occurred in chronic alcoholics, and in which there was no history of syphilis; and no evidences of its existence were revealed by examination of the blood serum and cerebrospinal fluid. Other instances of loss of the pupillary light reflex have been recorded in syringomyelia by Dejerine and Miraille and others, in disseminated sclerosis by Van Rad, in diabetes by Biermann, in head injury by Guillain, Franke and others, and in pineal gland tumor by Southard. The statistics that have often been cited to support the statement that such pupils occur in nonsyphilitics, but in which the blood serum and cerebrospinal fluid have not been examined are useless. It may be said that the Argyll Robertson pupil bespeaks the existence of previous or existing syphilitic disease of the central nervous system, tho, like all rules, this one may have exceptions. It is generally held that the prognostic significance of these pupils is grave; and that it heralds, often a long time in advance, the coming of tabes and general paresis, and other serious cerebrospinal manifestations of syphilis; this is not always the case, and the writer cites instances of 22 in-

dividuals who have had such pupils for upward of five years, without any indication of active syphilitic disease of the central nervous system.

Taking up the subject of syphilitic eye muscle palsies, the writer asserts; that the frequency with which functions of the cranial nerves are disordered in syphilis of the brain, has been habitually overstated by writers. In the 790 cases upon which this study is based there was a history of diplopia in 150 cases, i. e., in about 20 per cent; and in only one-half of these were there evidences of third nerve involvement when the patient was examined. In other words, the ocular palsies of syphilis of the nervous system are often transitory and disappear spontaneously or therapeutically. They are often the earliest symptoms, especially of tabes and basilar meningitis. Besides being usually transitory and amenable to treatment they are generally partial; in comparatively few instances are they permanent; in the majority of cases they are not, as formerly held, predominantly of nuclear origin.

Regarding the particular nerve involved, the third was partially or completely paralyzed in 62 instances (on both sides in only 5 examples, contrary to the opinion of Uhthoff that bilateral involvement was almost as common as unilateral). The sixth nerve was affected 31 times in this series of 790 cases; and the fourth nerve was the seat of palsy in only 5 instances. As a rule syphilitic paralysis of the third nerve is not only unilateral but partial. The explanation of this is that the lymphocytic infiltration which constitutes the essential pathologic lesion of syphilis of the nervous system may vary in size, intensity and extent; total paralysis is usually either the expression of gumma which causes compression of the trunk of the motor oculi nerve, at some place during its intracranial transit, or of an extensive basilar meningitis.

Eye muscle paralysis may occur alone or in combination with paralysis of other cranial nerves; sometimes no involvement of the nervous system is found, save an isolated ptosis or abducens palsy. Oftentimes one finds peculiar combinations of disturbances, that remain after a double-sided ocular palsy; for instance, patients who are unable to look upward, and when they try to do so convergence results, and when they try to converge they cannot. Lipschutz gives the following explanations of this: In these patients there was originally complete oculomotor paralysis, so that they could neither look up nor converge. As a part of the restorative process new fibers grew out of the central stump. These new fibers did not, however, reach the muscle for which they were originally intended; they were deflected, and instead of going to the rectus inferior they went to the rectus internus. When the patient makes the effort to look upward the impulse goes thru the internus instead of the inferior. This interpretation of Lipschutz seems to have been accepted in a way by ophthalmologists. But it is not characteristic of syphilitic lesions. It may occur in any disease that destroys the roots of the nerve while the nuclei are preserved.

Regarding syphilitic infection of the optic nerve, Collins found that this occurred more frequently than was expected, and in 95 cases of the entire number there was disease, either inflammation, choked disc or atrophy, postneuritic or simple. It is strange and inexplicable that optic nerve atrophy is rarely observed in general paresis, and this was illustrated in the writer's series of cases by finding but one instance of this anomaly. The affection of the optic nerves in syphilis of the brain, whether it be choked disc, optic neuritis or atrophy, may be the result of increased intracranial pressure, the direct effect of the meningeal proliferation or pressure from a gumma. It may likewise be due to syphilitic disease of the brain, especially of the anterior quadrigeminal or the geniculate body. Involvement of the trunks of the optic nerves may take place at any part of their course, but they are most liable to be affected at the chiasm, and the changes that take place in the fields as well as in the nerve itself are most variable.

Finally the writer takes up the question of the amenability to treatment of the nervous diseases of the eye due to syphilis. He has never seen an instance of disorder of the pupils caused by syphilis of the nervous system disappear spontaneously or under treatment. Some of the muscle paralyses yield to treatment readily, others are most rebellious. The important matter is to distinguish one from the other. "In a general way it may be said that the vast majority of cases of muscle paralysis associated with symptoms that justify the diagnosis of meningitis, especially those coming on abruptly, yield to treatment or recover spontaneously. On the other hand, those due to nuclear lesion (which are apt to develop insidiously) are rebellious and unamenable, but the majority of permanent ocular palsies are not of nuclear origin. Some of those that are nuclear at the end of life may have once been radicular. Some eye palsies are dependent upon destructive lesion of nerve bundles that cannot be regenerated. The longer an ocular palsy has been in existence the more unfavorable, as a rule, is the outlook."

Optic neuritis and choked disc, unaccompanied by symptoms of increased intracranial pressure, often disappear almost magically under appropriate treatment. Collins has never seen a case of primary atrophy yield to treatment, nor has he seen optic neuritis develop after the use of salvarsan. In conclusion he calls attention to the fact that ophthalmologists have a unique opportunity to aid in the early detection of syphilis of the nervous system. Patients who show pupillary anomalies, particularly in size, contour and responsiveness to light, should be counseled to report to their physicians for examination of the blood serum and cerebrospinal fluid, with the same seriousness as they are sent for investigation of the urine when retinitis albuminurica is found. No case of disease of the nervous mechanism of the eye that has its origin in syphilis should be considered beyond recovery, or unsuitable for treatment, save primary nerve atrophy that has gone on to completion. C. H. M.

Wiener A. Bilateral Total Ophthalmoplegia. Medical Record, 1918, p. 724.

Wiener reports the occurrence of this condition in a patient sixty-seven years of age, with arteriosclerosis and a mild interstitial nephritis. The ophthalmoplegia developed suddenly after an attack of influenza. He believes that such a condition could be due only to a vascular lesion. Blocking of the basilar artery by a toxic arteritis would account for this clinical picture. The prognosis is good, a collateral circulation developing probably thru the circle of Willis. F. B.

Richard. Treatment of Syphilis with Galyl. (La Clinique Ophtalmologique, August, 1917).

Galyl is a French substitute for arsphenamin. The author used it with good results in 80 cases. The intravenous injection of strong solutions was employed, using 0.2 gms. of the salt every fourth day in the vigorous cases and only one every sixth day in the poorly nourished cases. In all between 1.60 to 2.0 was given during 35 to 45 days in 8-10 injections. Local reactions were few, except where the cellular tissue was infiltrated. The therapeutic results equalled those of salvarsan, which drug it should replace entirely, being of French discovery and manufacture. J. S. W.

Demaria and **Caldora. Movements of Upper Lid with Mastication.** Bol. de la Soc. de Oftal. de Buenos Aires, v. p. 70.

The history of a case of this rare anomaly is given. During rest a slight ptosis existed of the right eye, disappearing and even leaving exposed a part of the sclera, above the cornea, as the inferior maxilla was drawn downward in mastication. The elevation of the upper lid attained its maximum when the jaw was moved laterally in the direction opposite the affected eye. The other ocular muscles were normal

except that the pupil was larger than of the other eye, altho its reactions to light, accommodation, etc., were not impaired. The presence of this anisocoria is the principal interest of the case.

The anomaly is stationary. Sixty-eight cases have been reported to date, the first being that of Marcus Gunn in 1883. All these observations can be divided in three groups. In the first the elevation of the lid is produced when the mouth is opened and the jaw displaced laterally. In the second (less numerous) the levator palpebrae contracts only in opening the mouth; and in the third group only when the jaw is moved laterally.

The most general opinion of the cause of this condition is that the nucleus of the oculomotor is congenitally in relation with the trigeminus, and even with the facial, the movements of mastication being principally commanded by the mesencephalic center which is near the origin of the oculomotor. Lutz, however, opposes this view and holds that the disorder must be located in the subcortical centers. On the ground of the anisocoria observed in their cases, the authors claim that the trouble must reside in the cortical centers near the foot of the frontal convolutions, which are probably connected with each other by Meynert's U fibres. URIBE-TRONCOSO.

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AN OPHTHALMIC ADVENTURER—JULIUS HOMBERGER.

From earliest colonial times adventurers have sought in the new world a refuge from oppression or an outlet for their energies; and among them have been all sorts of physicians. Few have influenced professional thought more decidedly for a time, or sunk more completely into oblivion afterward than Julius Homberger, the founder, editor, and publisher of the first ophthalmic journal published in the United States. He was a German who came to New York in January, 1861. Of his earlier life little is known, but he was evidently of good education, and of respectable connections in Europe.

Before coming to America, he had published, at Würzburg, a twenty-page monograph on "Spinal Curvature"; and he dedicated his journal "in testimony of the friendship and gratitude of the editor" to Heinrich Schwarzschild in Frankfort on the Main. His familiarity with the work of Graefe, and the extensive translations from Graefe's writings published in his journal, make it probable that he had worked in Graefe's Clinic. When the supplementary committee on the organization of the Universal Society of Ophthalmology was appointed in 1861, he, with the venerable surgeon, Valentine Mott, was named to represent New York.

In July, 1862, he published the first number of his journal; which was to be issued bimonthly, and called the American Journal of Ophthalmology. The first number contained an installment of a translation of Graefe's article on "Diphtheritic Conjunctivitis and the Use of Caustics in Acute Inflammations," then an article of his own on the "Anomalies of Motility of the Human Eye," followed by the report of the Universal Society of Ophthalmology, that met in Paris the preceding October. Abstracts of articles by a half dozen of the most famous European oculists, bibliographic reports naming different works recently published, a letter from Wecker, and a department of notes and queries made up this first

number. Continuations of the first two articles mentioned, with similar abstracts and reports, constituted the substance of each of the succeeding numbers.

Among the European authorities thus brought to the attention of American readers, in the 256 pages which constitute the first volume, we find in addition to the names already mentioned, those of Bowman, Desmarres, Donders, Galezowski, Liebreich, Pagenstecher, Saemisch, Schweigger, Sichel, Warlomont, and Zander. The only American writer honored with an extended abstract was E. Williams, of Cincinnati.

In the second volume the character of the journal changed. The first three papers were by the editor himself. Then there came two from Dr. E. L. Holmes, of Chicago, and another by the editor; then the portion of a review of Donders' theories regarding astigmatism and cylindrical glasses. The abstracts are from Critchett, Hughlings Jackson, and a symposium on calabar bean. Of the second volume but two numbers appear to have been published.

Why so excellent a journal did not establish itself is largely due to the smallness of the number of Americans really interested in ophthalmology at that time; but is partly accounted for by certain characteristics of the editor. He used its pages for uncomplimentary remarks that must have been exceedingly annoying to the gentlemen mentioned, and to their friends.

There is a severe attack on the book of Dr. Henry W. Williams; most specifically dwelling on the folly of attempting to present the whole subject of ophthalmology in so small a work. Again the editor used the occasion of a paper by Dr. Henry D. Noyes, before the N. Y. Academy of Medicine on the subject of "Effects of Albuminuria in Vision," to comment thus on a case that had been reported to the New York Pathological Society as one of "unsuspected Bright's disease." "We had been consulted by the same patient some days before the general symptoms set in, and had diagnosed the disease with the ophthalmoscope alone. The physicians attending his deathbed still found the trace of our activity in the dilated condition of the right pupil of the patient. Again not suspecting the hand of the specialist in want of a drawing for his collection of ophthalmoscopic sketches, they indulged in speculations as to the cause of this extraordinary unilateral mydriasis!"

When he had lived in New York two years he had stirred up the Department of Public Charities and Correction on the subject of establishing special wards in the Bellevue Hospital devoted to diseases of the eye, the ear, the skin and nervous diseases. When the Board, after seeking general information and advice on this subject, decided to establish an outdoor department for such diseases, Homberger wrote thus:

"When we read of the insane measures of the Prussian Government against the freedom and liberty of its subjects, we wonder how it is possible that the many severe teachings which history gave to tyrants are of so little avail, and how it is to be explained that a minority of privileged individuals dares to oppose the enforcement of the laws of liberty and equity. The Medical Board of Bellevue has the enviable privilege of offering a parallel to the excellent Herr von Bismark, by the above resolution. The latter gentleman and his followers despise to listen to the eloquent arguments of the representative of the people, and intentionally ignore the existence of an unabatable popular feeling for liberal institutions, while the Board of Bellevue enjoys its supremacy and does not allow the doctrines of a Graefe, a Toynbee, a Brown-Sequard, or a Hebra, to enter the wards of a hospital."

Dr. Homberger had announced in the first number of his journal his "personal conviction that the progress of medicine and surgery and science in general depends on the cultivation of special departments. We would defend the rights of the specialist in opposition to those who, while they pretend to embrace the whole field of general

practice, also claim to be listened to as authorities on individual branches, and at the same time attempt to throw distrust upon those who hold contrary views."

There were others in New York then actively interested in promoting specialization in medicine. But when on January 9th, 1864, eight men met at the office of Dr. Noyes for the organization of the American Ophthalmological Society, Dr. Homberger was not one of them, and he seems not to have been invited to join in the movement.

In June of that same year the American Medical Association met in New York. Dr. Homberger became a member of the Association, and offered a resolution regarding the relations of specialists to general practitioners. This resolution was supported by Drs. Elsberg and Gardener of New York, and D. H. Storer, of Boston. But it was defeated, and a special committee appointed to report upon the subject.

A year later at the meeting in Boston, Dr. Homberger read an individual report from his committee, favoring that specialists be allowed to advertise although general practitioners should not. When questioned, he frankly admitted that this report had not been submitted to his colleagues on the committee, because he believed that they would not sign it. Dr. H. R. Storer also read an individual report favoring specialism but opposed to such advertising by specialists. The third member of the committee, Dr. Hooker, of Connecticut, felt that he had not had sufficient opportunity to consider the matter. After debate the subject was referred to the Committee on Medical Ethics.

In 1866, at the meeting of the A. M. A. in Baltimore, Dr. D. H. Storer made specialization in medicine the subject of his presidential address, reviewing the common arguments and prejudices against it; and in conclusion welcoming the assistance of the specialist in the work of the medical profession. From the Committee on Medical Ethics, Dr. Hooker read the majority report adverse to the recognition of exclusive specialism, while exploiting a partial specialism. But Dr. Henry J. Bowditch, of Boston, read a minority report, a direct plea for specialization and progress. Both reports were published without final action by the Association. During the discussion thereon, Dr. Homberger was permitted to make a personal explanation with regard to advertising; what was the nature of this explanation does not appear from the record. But evidently he had the courage of his convictions with regard to advertising, or, more likely, a good deal of indifference to the views and standards of his professional colleagues. The Medical and Surgical Reporter of Philadelphia, and from it the Boston Medical Journal (Vol. 74, p. 366) quoted a few months later, his advertisement from a Philadelphia newspaper, proclaiming in distinctly quackish phraseology his special skill.

Somewhat later he went from New York to New Orleans, where he published in 1869 a 20-page pamphlet entitled "Batpaxomyomaxia; a Fight on Ethics." At the close of the meeting of 1866, Dr. Homberger tendered his resignation from the American Medical Association. This was not acted upon until 1868, when the subject was brought up and he was expelled from the Association. At the same meeting the following resolutions were adopted:

Resolved, That this Association recognizes specialties as proper and legitimate fields of practice.

Resolved, That specialists shall be governed by the same rules of professional etiquette as have been laid down for general practitioners.

How long Dr. Homberger lived, when and where he died, whether he continued to practice in America, or went back to Europe, disgusted to learn that "Order is Heaven's first law" even in new countries, we have been unable to learn. He is not the only man coming out of Germany expecting immediate recognition as a being of superior order, who has been disappointed in that expectation. But his principal achievement in starting an American Journal of Ophthalmology

and the good judgment shown in his selection of the material he published make it desirable that Americans should know a little more about him. When Dr. Alt started his American Journal of Ophthalmology, he did not know that the name had been used before, or of the existence of his compatriot, who had disappeared from professional view 15 years earlier.

In his fair professional education, his disposition to travel, and his inclination to charlatanism, Dr. Homberger reminds us somewhat of the English adventurer "Chevalier Taylor." But like most such adventurers, he fell far short of Taylor's social and financial success. E. J.

FRANK CHISHOLM TODD.

AN APPRECIATION.

Todd of Minneapolis has passed; dead in the line of duty from pneumonia, contracted in our American Army service while in active performance of his duty; a sacrifice to the Moloch of war, passing away, however, with his immediate work nearly completed and well done. We miss him greatly; we remember the man that he was; we remember his accomplishments; his achievements and the great help that he has been to the progress of ophthalmology. Minneapolis loses one of its foremost citizens; ophthalmology sees a shining light quenched; the Army loses a valuable officer; his students an example to which they may aspire; his friends a delightful companion; and his family a devoted husband and father. I knew him well for many years. I loved the man and admired his character as well as his attainments. Vale Todd! Moritirur te Salutant!

H. V. W.

A PLAN FOR THE MOBILIZATION OF PHYSICIANS.

(1) Commission all physicians within the draft ages; if feasible all up to the highest age limit allowed for voluntary enlistment in the Medical Reserve Corps. Exempt only those actually physically incapacitated to practice medicine or surgery.

(2) Divide the country into districts, varying in size according to the density of the population; the denser the population, the smaller in area; the size of the districts also to be governed by the means of communication.

(3) Assign to each district an internist, a surgeon, and an obstetrician. Group several districts into larger districts, to which assign an oculist, a rhinologist, a neurologist, etc.

(4) Assign to these districts physicians who might be entitled to exemptions for various reasons—dependency, hospital connections, advanced age, etc.

(5) All others to be put into military service.

(6) Patients to be required to consult the physician within their respective districts. Or to put it another way, no physician to be permitted to treat anyone outside of his district.

(7) A record to be kept of all fees collected. Of the fees a certain percentage to be retained by the physician. The remainder, from all physicians, to be put into a general fund and divided among the men in actual military service. C. L.

BOOK NOTICES.

THE ACTION OF MUSCLES, Including Muscle Rest, and Muscle Reeducation. By **William Colin MacKenzie,** M. D., F. R. C. S., F. R. S. (Edin.), with 99 illustrations. Paul B. Hoeber, 67 and 69 East Fifty-ninth street, New York City, 1918. Price $3.00.

The appearance in the last few years of extensive essays confined to one particular medical subject marks an advance in the progress of medical literature. Of this character is the present book.

This subject is of special interest at present, as the view is held that of the wounded men returning from the great war, 65 per cent are suffering from disabilities of an orthopedic nature, the injuries being of such a character that the muscular function becomes the

one of prime importance for purposes of treatment.

This function can only be taught on the living. It is largely a question of comparison between the normal and paralytic; and, especially in the latter case, the knowledge of the action of the opponent muscles is particularly necessary. True paralysis of the muscular tissue is very rare, a loss of a part of the function of a muscle is on the other hand, common. There is only one true test of muscular function, the volitional test scientifically applied.

In this book, 47 pages are given to the principles of muscular action; and the balance, up to 249 pages, to their practical application, with an extensive index of 18 pages in addition. Not only the diagnosis is well entered into, but the treatment with apparatus development and methods of reeducation, both of the injured muscles and of their assistants, are thoroughly discussed.

This book is of great value to the general surgeon. H. V. W.

NEUROLOGICAL CLINICS. Exercises in the **Diagnosis of Diseases of the Nervous System,** given at the Neurological Institute, New York, by the Staff of the First Division. Edited by Joseph Collins, M. D. New York. Paul B. Hoeber, 1918. Price $3.00.

No longer is neurology practically limited, as it was at first, to the consideration of mental diseases and the paralyses. But it is now so closely associated with not only general medicine, but also with the specialties of ophthalmology and otology, that it behooves not only the general practitioner, but the eye and ear man to make himself thoroughly familiar with anything that may occur within the cranium, as well as those lesions and symptoms which are associated with the organs of special sense and with the body.

This book is a collection of essays by a number of authors, being case histories selected from those presented by the First Division of the Neurological Institute at the biweekly conference, care being taken to select those most likely to be encountered by the practitioner, but which he finds difficult to interpret and diagnosticate satisfactorily.

In the 41 essays it is particularly interesting to the ophthalmologist to note that in a very large proportion of them, the diagnosis has been markedly assisted by the ocular findings. Even in certain cases of brain tumor where there has not been a choked disc, the other findings, of the pupillary reactions, the visual fields, the ocular muscles, etc., have been of diagnostic value.

Of great interest is the essay on Myasthenia Gravis with photographs of patients showing their facial expression.

All the essays are well written and make very interesting reading.

H. V. W.

INTERNATIONAL CLINICS, Series 28, Vol. 2. Edited by R. H. M. Landis, M. D., Philadelphia. 286 pages. Illustrated. Philadelphia and London, J. B. Lippincott Company, 1918.

The sections of this volume of especial interest to the ophthalmologist are the Clinic by E. V. L. Brown, of Chicago, on "Focal Infection as a Cause of Keratitis and Iritis"; and "Primary Tuberculosis of the Conjunctiva," by Gaston E. Ayraud, surgeon to the Maritime Health Department, France.

Brown's lecture is based on three cases of keratitis, two interstitial, one phlyctenular, and two of iritis. In four of them improvement had followed removal of the tonsils. He also mentions another case in which unilateral interstitial keratitis occurred in a girl with a four plus Wassermann reaction. No improvement followed a month of inunctions and iodid. The tonsils were removed and in 2 or 3 days the eye had "improved marvelously," and was white and quiet in a week.

Ayraud reports a case in which giant cells and tubercle bacilli were found, a few of the latter in the conjunctival tissue and many in the cheesy pus from an enlarged gland, altho the inoculation of a guinea pig gave a negative result. The patient was a boy of 8 who seemed

generally healthy, and the disease was believed to be primary in the conjunctiva. It followed slight injury and the preauricular gland was the first to be enlarged. Recovery seemed complete. A section of the book which while not dealing with diseases of the eye will be of general interest to ophthalmologists is one on "The Early Diagnosis and Treatment of Syphilis of the Nervous System," by John E. Lind of Washington, D. C. E. J.

CORRESPONDENCE.

RETINAL DETACHMENT TRAUMATIC?

To the Editor:

There has recently been under my care a case of retinal detachment occurring three weeks after an alleged traumatism. The detachment occurred in the upper half of the retina. Briefly the history is of three weeks of indefinite symptoms and then a sudden hemiopia in right eye. He came to me at this time. Vision was 10/200 in the right eye, 10/10 in the left. Ophthalmoscopic examination showed a simple detachment, which has extended to the lower half.

There is nothing peculiar in this case in itself other than the alleged cause.

I would like to have an expression of opinion thru the JOURNAL as to the probability of a jet of compressed air directed against an eye at a distance of five inches being productive of retinal detachment, in a case with no inflammatory symptoms such as a conjunctivitis or cyclitis being produced.

I have been unable to find any reference in literature about the effects of compressed air trauma.

Hoping some useful information may be obtained, I am

Very truly yours,

WM. RAE YOUNG, M. D.

Wilkinsburg, Pa.

BIOGRAPHIC SKETCHES.

THOMAS HALL SHASTID, M. D.

SUPERIOR, WISCONSIN.

JOHN CHASE, Emeritus Professor of Ophthalmology in the University of Colorado, died at his home in Denver, May 3rd. He was born at Ann Arbor, Michigan, December 10th, 1856, and graduated from the collegiate department of the University of Michigan in 1879.

In 1881 he graduated from the medical department of the same institution, and entered upon ophthalmic practice in association with Doctor Eugene Smith of Detroit. He spent some time studying in Paris and London, and settled in Denver in 1885.

He acquired a large practice and was active in the organization of the Gross Medical College, one of the medical schools afterwards merged in the Medical Department of the University of Colorado. He wrote little and his teaching was largely clinical.

For many years he was actively interested in military matters, having joined the National Guard of Michigan in 1878. In the Colorado National Guard he rose from private to the rank of Brigadier General, and served for seven years as Adjutant General of the state. His large frame, military bearing, and open, cordial manner, made him a commanding figure in any gathering, and won for him many friends.

FRIEDRICH CURT HARNISCH, a well known ophthalmologist of Chicago, died from heart disease in the Alexian Brothers Hospital, May 25, 1918. He was born Dec. 1, 1860, at Teuchern, Saxony, Germany, son of August and Beata Harnisch, and received his degree in medicine at the University of Leipsic in 1890. He practiced for a time at Leipsic, and the date of his removal to America has not been learned. He married in 1886 Anna Haferkorn. He was a man of medium height, thick set, of florid complexion, blue eyes, gray hair, and a grizzled Van Dyke beard. He was ophthalmic surgeon to the Alexian Brothers, St. Elizabeth's, and St. Mary of Nazareth's Hospitals.

HUGH TATE MOORE, Lieut., M. R. C., of Wilmington, N. C., died at Camp Kearney, San Diego, Calif., April 8, 1918, as a result of poisoning by mercuric chlorid taken by mistake for calomel. He was born at Bolivar, Tenn., in 1887, grew up at Bolivar, and studied

at Tulane University, New Orleans, where he received the M. D. in 1900. For about two years he practiced general medicine in New Orleans. In 1912 he removed to Wilmington, where he practiced as ophthalmologist and otolaryngologist until, in August, 1917, he entered the medical service of the army. He was a member of the First Presbyterian Church at Wilmington, and oculist and aurist to the James Walker Memorial Hospital. An acquaintance of the doctor writes, "He was a big-hearted, genial man, an excellent sportsman, genial and with a strong and robust physique. His death comes as a shock to his hundreds of friends."

GEORGE G. MURRAY, of Bellows Falls, Vt., died of pneumonia at his home on July 5, 1918. As a specialist on diseases of the eye, ear, nose and throat, he was well known locally. Born in Little Shemogue, New Brunswick, in 1876, he came to the United States to study medicine, and received his degree from the University of the South at Sewanee, Tenn., in 1901. For a time he engaged in general practice at Orville, Vt., but in 1908 removed to Rutland, and a year later to Bellows Falls, where he practiced until his death as ophthalmologist and otolaryngologist. Besides the widow and two sons, Dr. Murray left two brothers, D. T. Murray, of Dorchester, Mass., and Dr. Albert G. Murray, of Baxterville, Miss.

ADDISON JOHN PROVOST, ophthalmologist and otolaryngologist of Oshkosh, Wis., died at Hot Springs, Ark., July 7, 1918. He was born in Theresa, Dodge County, Jan. 14, 1863, removed with his father's family to Menasha, and later to Rudolph, in Wood County. For a time he worked as conductor on a railway, whereby he earned the means for a medical education. His medical degree was received at the Hahnemann Medical College, Chicago, 1891. For a time he practiced at Monroe, Wis., where, on Sept. 6, 1893, he married Miss Nell Sutherland. Of the union was born one child, a daughter. Shortly afterward the couple removed to Monticello, later still to Merrill, and, finally, to Oshkosh, where the Doctor was a specialist in diseases of the eye, ear, nose and throat for many years. He enlisted in the medical department of the army, and, with the rank of captain, was stationed first at Ft. Riley, Kansas, later at Fort Bliss.

ARTHUR WASHINGTON DE ROALDES, famous blind otolaryngologist, and founder of the New Orleans Eye, Ear, Nose and Throat Hospital, died at his home in New Orleans, June 13, 1918. He was born in Opelousas, Louisiana, Jan. 25, 1849, son of Dr. Abel, and Coralie Testas de Folmont, de Roaldes, of an old south of France family. He was educated by the Jesuits in France, and later awarded the diploma of bachellier-és-lettres in 1865. The following year he was made bachellier-és-sciences. Returning to America, he received the medical degree at the University of Louisiana in 1869, and then went back to France for further medical study. His ad eundem was received at the University of Paris in 1870. He served with great distinction thruout the Franco-Prussian war, rescuing at one time seventeen wounded from a burning house in Bazailles during the heat of battle. In 1872 he returned to New Orleans, and soon was widely known as a general practitioner.

In 1887-89 Dr. de Roaldes made a special study of the eye, ear, nose and throat in the hospitals of Europe; and returning again to New Orleans, began to practice otology and laryngology. In 1889 he founded the New Orleans, Eye, Ear, Nose and Throat Hospital, also known as "The Senses Hospital," and was a trustee thereof and its surgeon-in-chief for many years. In 1890 he was made professor of diseases of the ear, nose and throat in the New Orleans Polyclinic.

We cannot mention here all the numerous honors which came to Dr. de Roaldes. He was made, however, a Knight of the Legion of Honor, and when he founded the Eye, Ear, Nose and Throat Hospital, the French government promoted him, and made him a grand commander in the Legion. He was also a Fellow of the American Col-

lege of Surgeons, a Member of the Institute of Social Sciences, and Chevalier of the Italian Order of St. Maurice and St. Lazare, and Commander of the Papal Order of St. Gregory the Great.

Dr. de Roaldes was a man of medium height and weight, of a dark complexion, and brown eyes. He wore, as a rule, a Van Dyke beard. His manner was alert, prompt, and energetic. He was a Democrat, a member of the Roman Catholic Church. He was twice married, first, in 1873, to Laura Pandely, who died in 1874, and in 1885 to Anna E. Miller, who survives him.

For the last twenty years of his life he was wholly blind, "but," as a friend declares, "despite this handicap he continued the practice of his profession as a specialist, working in surgery by the hands of others. A notable case of his almost uncanny skill, despite his blindness, occurred some years ago, in a mastoid case. The surgery to be em-

Arthur William de Roaldes. 1849-1918.

ployed was of the most delicate nature, and the surgeon assisting Dr. de Roaldes was operating with extreme caution. After the operation had proceeded to the point the operator thought could be followed with safety to the patient, the blind surgeon gently touched the affected part, and said to his coadjutor, 'I would go deeper here.' A further incision was made, and the necessity of the additional cut, which exposed diseased bone, was shown."

Richard Wash Salter, a prominent ophthalmologist and otolaryngologist of New Orleans, died July 7, 1918. He was born in New Orleans, son of Thaddeus S., and Mary Drummond, Salter. His medical degree was received from the medical department of Tulane, University, New Orleans, in 1892; whereupon the Doctor proceeded to the study of ophthalmology and otolaryngology in New York, London, and Vienna. Returning to New Orleans, he soon was widely known as a skillful operator, especially on the eye. From 1908-18 he was connected with the New Orleans Eye, Ear, Nose and Throat Hospital. His death is said to have occurred from a pistol wound in the head, self-inflicted with suicidal intent. He is survived by his widow, born Edna Bosse.

John Miller Stephens, of Pasadena, California, was killed in an automobile accident near Santa Maria, Calif., July 10, 1918. He was born in 1879 and received his medical degree at the Bellevue Hospital Medical College in 1903. The date of his entry into eye, ear, nose and throat work is not ascertainable. He had been unwell for a number of weeks at the time of his death, and had planned to take a vacation.

Frank Chisholm Todd, Lieutenant Colonel N. A., American ophthalmologist of international reputation, died from lobar pneumonia at the Presbyterian Hospital, Chicago, July 4, 1918, having come to that city on a tour of inspection of camps. His body, returned to Minneapolis, was given a funeral with military honors. He was born at Minneapolis, Oct. 15, 1869, son of Shubal D. and Lidana Ann Whicher Todd. He attended for a time the academic college of the University of Minnesota, but did not complete the course. He received, however, at the same university the degree in dentistry in 1891, and the Doctor of Medicine in 1892. Having studied ophthalmology and otolaryngology at New York, London, Paris, Berlin and Vienna, he returned to Minneapolis to practice. In 1899 he was made professor of diseases of the eye, ear, nose and throat at his alma mater. In 1902 he was made chief of the department, a position which he held until his death.

Dr. Todd was surgeon to the University of Minnesota, the Hill Crest Surgical, St. Barnabas, City, Northwestern, and Asbury Hospitals; and to the Chicago, Milwaukee and St. Paul Railway. He was a Fellow of the American Academy of Ophthalmology and Otolaryngology, of the American College of Surgeons, a Member of the Association of Military Surgeons. In 1902 he was President of the Hennepin County Medical Society, and, in 1914, was President of the Minnesota Academy of Medicine. He was an active member of the Section on Ophthalmology of the American Med. Association, and served as its Secretary 1902-03, and as its Chairman, 1913-14. He was the secretary and one of the organizers of The American Board for Ophthalmic Examinations.

Shortly after the United States entered the war, Dr. Todd enlisted in the Medical Reserve Corps, being commissioned as Major. Later he was transferred to the National Army, and advanced to a lieutenant colonelcy. He was first assigned to the base hospital at Camp Dodge, of which he was shortly made commanding officer. At the time of his death he was expecting to take his hospital unit for overseas service.

Lieut. Col. Todd was a man of medium height, spare of build, usually with a small moustache, blue eyes and sandy hair. He was deliberate, methodical, thoro. He was very fond of history, a Republican in politics, a member of no church, yet not a disbe-

liever. He married, Oct. 15, 1894, Mary Mabel Odell. Of the union were born four children, Margaret, John, Ann, Mary Mela. His place in ophthalmology, and in the hearts of all who knew him, cannot soon be filled.

Frank Chisholm Todd. 1869-1918.

CHARLES SMITH TURNBULL, ophthalmologist and otolaryngologist of international reputation, died of pneumonia at his home, 1935 Chestnut street, Philadelphia, Feb. 21, 1918. He was born at Philadelphia, Nov. 10, 1847, the son of Dr. Laurence and Louisa Paleska (Smith) Turnbull. He received the A. B. at the Central High School, Philadelphia, in 1868, the A. M. in 1869, the Ph. D. at the University of Pennsylvania in 1871, and the medical degree at the same institution two years later. In 1874-5 he studied the eye,

ear, nose and throat at the University of Vienna.

Dr. Turnbull was surgeon to the U. S. Geological Survey in Wyoming and Montana in 1872, and of the Yellowstone Park in 1871-72; resident surgeon to the New York Ophthalmic and Aural Institute in 1873-75; chief of the aural department at the Jefferson Medical College for ten years; oculist and aurist to the German Hospital, Philadelphia, for more than thirty-five years, and for many years to other leading Philadelphia hospitals. He served in the Civil War in the 119th Pennsylvania Volunteers, and, since 1900, was major-surgeon of the First Infantry, N. G., Pennsylvania.

Dr. Turnbull married Elizabeth Claxton, of Philadelphia, Oct. 18, 1877, and left three daughters, Mrs. Hamilton D. South, Mrs. M. R. Goldsborough, and Mrs. Nelson P. Vulte.

He was the author of numerous articles on ophthalmology and otology, and also translated from the German, Arlt's "Injuries of the Eye Considered Medico-Legally," Gruber's "Tenotomy of the Tensor Tympani Muscle," and Bruner's treatise "On the Methods of Connection of the Ossicles."

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. As these columns go to press on the 30th of the month contributors should send in their items by the 25th. The following gentlemen have consented to supply the News Item Editor with the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. H. Kress, Los Angeles; Dr. Geo. F. Keiper, Lafayette, Indiana; Dr. W. Holbrook Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Chas. P. Small, Chicago; Dr. Geo. M. Waldeck, Detroit; Dr. G. Oram Ring, Philadelphia. It is desirable that this staff shall be enlarged until every city of importance in the United States shall be covered, as well as all foreign countries. Volunteers are therefore needed and it is hoped that they will respond promptly to this call.

DEATHS.

Capt. Samuel Cobb Norris of Anderson, Indiana, aged 48, died at his home August 4th from disease of the liver.

PERSONAL.

Dr. F. W. Edridge-Green has been appointed senior ophthalmic surgeon to the Central London Medical Boards for National Service Examinations.

Dr. William R. Murray has been appointed acting Director of the Department of Ophthalmology in the Medical School of the University of Minnesota.

Lieut.-Col. Casey Wood spent a few hours in Chicago recently, on his way back to Washington, from California. In addition to his other duties in the Surgeon General's office, Col. Wood is now in charge of a medical and surgical history of the war.

Dr. John G. Barnsdale, an ophthalmologist of Superior, Wisconsin, was convicted of violating the Harrison Narcotic Act and given a sentence of three years in the Federal Penitentiary at Fort Leavenworth and fined $6,000. He was released on bond and will appeal his case on a writ of error, contesting the constitutionality of the Harrison Act.

MILITARY NOTES.

Major Thomas A. Woodruff has been transferred to Camp Meade, Maryland.

Captain A. D. McConachie is now stationed at Base Hospital A, Orleans, France.

Dr. James G. Janney, of Lawton, Oklahoma, is abroad in the service with rank of captain.

The name of Capt. Harry N. Sweezy, of Lafayette, Indiana, is added to the Honor Roll.

Dr. H. A. Beaudoux, of St. Paul, Minn., has accepted a commission as captain in the M. R. C.

Dr. A. R. Irvine, of Salt Lake City, is now stationed at Camp Fremont, Palo Alto, California, with rank of captain.

Dr. Frank R. Spencer, of Boulder, Colorado, has accepted a commission in the Medical Reserve Corps, U. S. Army.

Capt. George E. Bellows, of Kansas City, has been assigned to the eye service at the base hospital at Ft. Riley, Kansas.

Dr. James A. Smith, who received a lieutenant's commission, M. R. C., in July, has been sent to Fort Oglethorpe.

Major A. C. Magruder, commanding officer of base hospital at Fort Sill, is on a short leave of absence visiting his family at Colorado Springs.

Dr. Charles P. Small has been promoted to the rank of captain. In addition to his duties as Head of the Chicago Physical Examining Unit of the Aviation Division, Capt. Small has been appointed Recruiting Officer and Medical Member of the Examining Board.

Lieutenant George Francis Patton, M. R. C., U. S. A., attached to the 165th regiment, the old 69th, has been decorated with the Croix de Guerre for bravery. During a heavy bombardment from the German batteries, in which gas shells were being used liberally, Lieut. Patton found that his gas mask hampered him in the dressing of wounds, so he removed the mask and went on working over the wounded until he was overcome. Dr. Patton was a graduate of the Baltimore Medical College in 1910, and at the time of entering the Reserve Corps was assistant attending surgeon to the Bronx Eye and Ear Infirmary.

MISCELLANEOUS.

The American Board of Ophthalmic Examinations will hold its fifth examination at the New York Eye and Ear Infirmary, New York, on Friday, October 25th, 1918.

Arthur S. Hamilton and Charles E. Nixon report in detail (Jour. A. M. A., June 29, 1918), the first case so far encountered of bilateral optic atrophy, which has developed as the result of exposure to binitrotoluene in the manufacture of explosives.

The Index of Oto-Laryngology, formerly published in Chicago by Dr. J. C. Beck, which ceased publication at the beginning of the year, has resumed publication in The Annals of Otology, Rhinology, and Laryngology, beginning with No. 1, of Volume 27, 1918.

The degree of Doctor of Ophthalmology was granted in June by the University of Colorado to Dr. Wm. G. Harrison, Professor of Otology, Rhinology and Laryngology in the University of Alabama, and to Dr. Harvey J. Howard, Professor of Ophthalmology in the Peking Medical College, China.

Silex, a Berlin ophthalmologist, has trained 250 blinded soldiers to be self-supporting. Among the blinded men were two lawyers, four musicians, two teachers, six merchants, and one physician. Positions in factories are now held by 88; 36 are typists or correspondents; 33 are doing agricultural work, and 7 are telephone operators.

In a civil service examination for telephone operator, which will be held in the near future, a blind man living in Jacksonville, Ill., will take the test. If he passes successfully, special equipment will be installed for his use, and the commission will plan to have this equipment installed in all such positions, and used by our returned blinded soldiers.

OPHTHALMIC LITERATURE

Under this head continuing the "Index of Ophthalmology" heretofore published in **Ophthalmic Literature** will be found the subjects of all published papers received during the last month, that bear to an important extent upon ophthalmology. The subject is indicated rather than the exact title given by the author. Where the original title has been in a foreign language it is translated into English. The journal in which the paper is published will indicate the language of the original.

The names of the different journals are indicated by abbreviations which generally correspond to those used by the **Index Medicus**, the **Journal of the American Medical Association**, and the **British Journal of Ophthalmology**. We will from time to time publish the list of ophthalmic journals, with the abbreviations used for each. Often a single letter discriminates between journals published in different languages. Thus "Arch. of Ophth." refers to the Archives of Ophthalmology, published in English; "Arch. d'Opht.," indicates the French Archives d'Ophtalmologie; "Arch. de Oftal." refers to the Archivos de Oftalmologia Hispano-Americanos, while "Arch. di Ottal." indicates the Italian Archivio di Ottalmologia.

In this index of the literature the different subjects are grouped under appropriate heads; so that all papers bearing on the same, or closely related subjects, will be found in one group. The succession of the groups is the same from month to month, and identical with that of the Digest of the Literature. Where a paper clearly refers to two subjects that belong in different groups, it will be noticed in both groups.

Each reference begins with the name of the author in heavyface type. This is followed by the subject of his paper. Then in brackets a number with (ill.) indicates the number of illustrations, or a number with (pl.) the number of plates illustrating the article, (col. pl.) indicates colored plates. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that the paper was read before some society and gave rise to a discussion which is published with it.

The "repeated titles" may render accessible the essential part of a paper, the original of which could not be consulted. These give (in brackets) after the author's name the volume and page of this department of "Ophthalmic Literature" where the title of the paper will be found; and then the journal, volume, and page where the translation or abstract is published.

It is desired to notice every paper as soon as possible after it is published. Readers will confer a favor by sending titles they notice have been omitted, with journal and page of publication; and of their own papers, sending either a copy of the journal in which each appeared, or a reprint. These should be sent as soon as possible to 318 Majestic Building, Denver, Colorado.

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